SYLLABUS IN MUSIC THEORY

Section I:

Topic I: Major Scales, Staffs, Clefs and Key Signatures

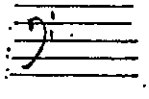
A scale is a progressive arrangement of the tones used in a musical composition. Like many of our musical foundations, scales are historical results of artistic and natural tendencies. Probably the artistic tendencies, while they must operate within the limitations of natural laws, are more significant[1].

The usual scale of the Western world is the diatonic, which we first find in ancient Greek music. It is made up of a particular order of half-steps and whole-steps. A half-step is the smallest used difference in pitch. A whole-step is twice as large as a half-step. A half-step is 1/12 of an octave. An octave is made up of 8 successive steps of the diatonic scale. The particular arrangement of half-steps and whole-steps comprising the diatonic scale will be presented in Topics I and II. Tones an octave apart are labelled with the same letter, for example, the distance from one "C" to the next "C" is an octave.

A staff is a series of horizontal lines which serve to indicate relative pitches. The historical development of this is most fascinating[2], but it is enough here to simply say that the five-line staff was first used about 1200, and was almost universally used by about the 17th century. A present-day use of a 4-line staff is found in Gregorian chant notation used in the Roman Catholic church.

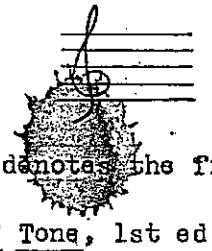
A degree is a line or a space on the staff.

A clef is a point of reference used to determine which degree shall represent which pitch. Clefs also have a very interesting history[3], having developed from letters. For example, our bass clef sign, 𝄢, grew from F, which, simplifying a good deal, became something like 𝄢, then 𝄢. There are three common clef signs, the F or bass clef, 𝄢, the C clef, 𝄡 or 𝄠, and the G or treble clef, 𝄞. Nowadays the F (bass) clef is always placed on the fourth line (lines and spaces are always counted from the bottom), like this:



and denotes the male voice middle F, which is the first F below middle C.

The G (treble) clef is always placed on the second line,



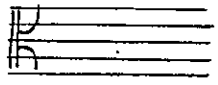
("on" means "surrounding"), and denotes the first G above middle C.

1 See Helmholtz, Sensations of Tone, 1st ed. 1875, pages xv, 568, & 383, and Tovey, Donald, The Integrity of Music, page 45

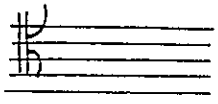
2 See Harvard Dictionary, page 708

3 See Harvard Dictionary, page 158

The C clef, however, may be placed in several different places, and always denotes middle C. If placed on the middle line, like this:



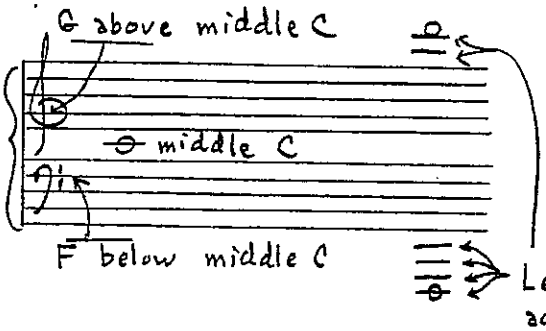
the clef is called alto clef, and the middle line is middle C. If placed on the 4th line:



the 4th line is middle C, and the clef is called tenor clef. Finding middle C then, one can read music using C clefs, whether or not he remembers which is alto and which tenor. In the 17th & 18th centuries another C clef was common, too, the soprano clef:

Still another C clef, the mezzo-soprano, is found occasionally.

To notate a sufficiently wide range convenient for keyboard instruments, a G clef and an F clef are put together to form a great staff:



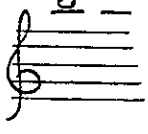
Usually, for convenience and legibility, the treble and bass staffs are separated by a larger space; then middle C is placed near the treble, or near the bass, whichever is convenient.

Added lines to extend the range above and below the five-line staff are called leger (or ledger) lines. There are two important points about leger lines which students often fail to understand:

1. Have leger lines a distance away from the staff and apart from each other which is consistent with the size of the staff used.

Like this: not nor

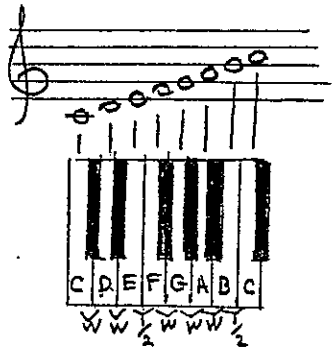
2. Use only the lines needed for a given note:

Like this:  not nor nor

The major scale is that scale made from the group of tones we call major. Its familiar sound will be heard whenever the tones are such that they make the pattern thus, reading up from the lowest pitch:

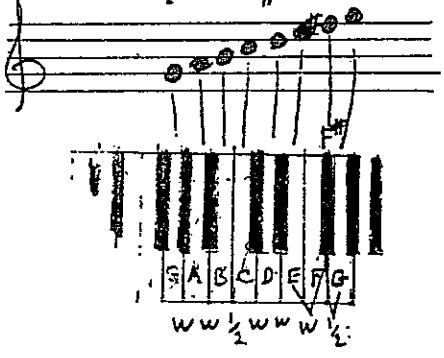
w w ½ w w w ½ w = whole-step, ½ = half-step

The simplest example of this is to be found from any C on the keyboard to the C above it, using only white keys. (Black keys represent half-steps between white keys.) Play that scale (with one finger, if you wish), noticing carefully the smaller pitch differences in the half-steps as compared to the whole-steps:



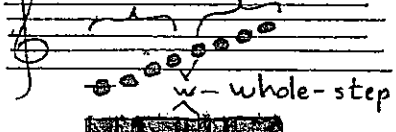
This is called the C Major scale. It has half-steps between the 3rd & 4th tones, and between the 7th & 8th.

If we begin on any tone other than C, and choose tones having that pattern, we will have a major scale. Begin on G, for example. The pattern will fit easily, using white keys only, until we come to F. Then we must change F to a higher pitch by using the black key just above F, in place of F. This is called F-sharp. The symbol for sharp is "#".

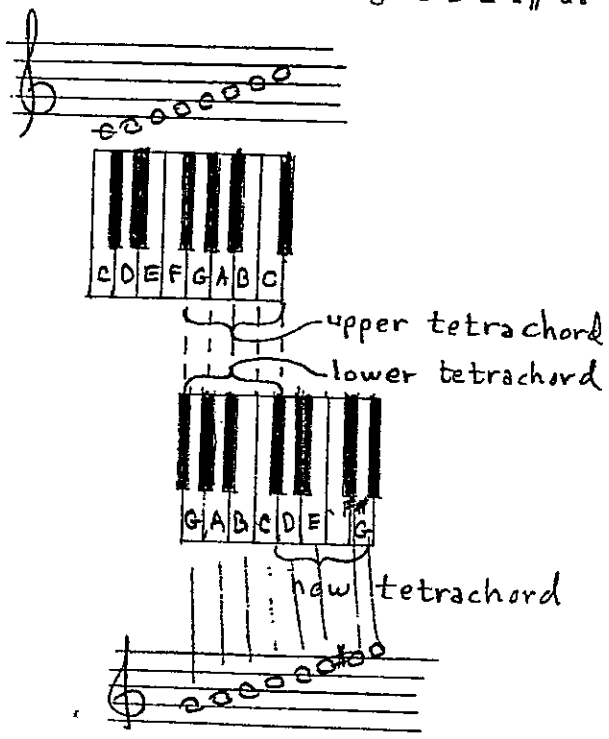


Play this, too. The pattern will sound like that of C. In other words, it will sound major.

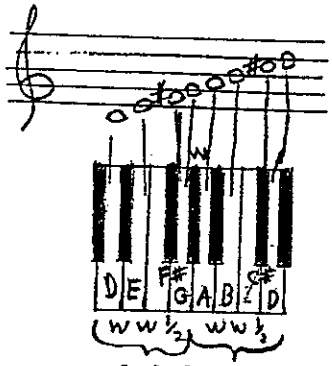
In discussing major scales, it is convenient to compare them by means of tetrachords. Tetrachords are patterns of 4 successive tones, which have come down to us from the use of strings in sets of 4 on the ancient Greek lyre. By putting together two tetrachords like C D E F, that is, having whole-, whole-, half-, we obtain a major scale, if we put the two tetrachords a whole-step apart.



Now let us compare the C Major and G Major scales in their tetrachord makeup. The upper tetrachord of C is revealed to be the lower tetrachord of G, and G has an upper tetrachord consisting of D E F# G:



This new tetrachord D E F# G can in turn be considered a lower tetrachord above which we can place a new upper to make a new major scale on D called the D Major scale. To get the proper tetrachord pattern of whole-, whole-, half-, (and therefore the proper scale pattern) we must raise C to C#:



Notice that the sharp needed for G Major was applied to the 7th tone of the G major scale, F, making it F#. Then notice that F# was needed again, and another sharp, C#, was needed, for the next scale, D Major. That new sharp C# was also the seventh tone of D Major.

If we continue in this manner, having the upper tetrachord of one scale become the lower tetrachord of the next, we will find that we always need all the old sharps and one new each time, that new one being always the seventh tone of the new major scale. Thus:

A Major will need old sharps F# & C# and new one G#, the 7th tone of A Major.

E Major will need old sharps F♯, C♯ & G♯ and new one D♯, the seventh tone of E Major.

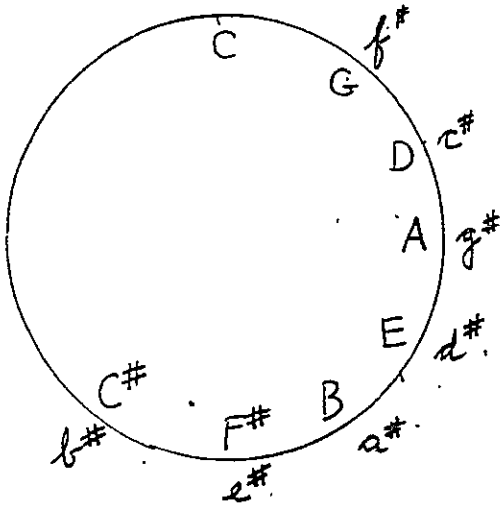
B Major will need old sharps F♯, C♯, G♯ & D♯ and new one A♯, the seventh tone of B Major.

F♯ Major will need old sharps F♯, C♯, G♯, D♯ & A♯ and new one E♯, the seventh tone of F♯ Major.

E♯ is a "white key" sharp. There is no black key a half-step higher than E, so we use the white one which is a half-step higher. This is the same tone we called F a little earlier, but it must be called E♯ when raised from E in this manner. Such tones, which involve different meanings for the same pitch, are called enharmonic. Continuing:

C♯ Major will need old sharps F♯, C♯, G♯, D♯, A♯ & E♯ and new one B♯, the seventh tone of C♯ Major. (B♯ is also a white-key sharp, enharmonic to C.)

The most convenient way to diagram this information and some other information needed later is to use a circle of keys. Think of this as a clock-face, as there will be twelve positions needed later. This diagram shows the essential information about sharp keys. Study it carefully, and use it for reference for the present. A more complete circle will be offered later:

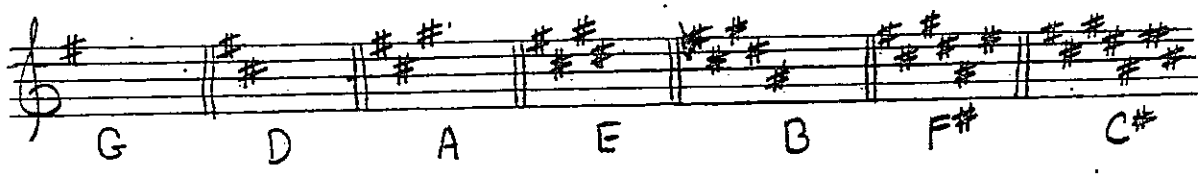


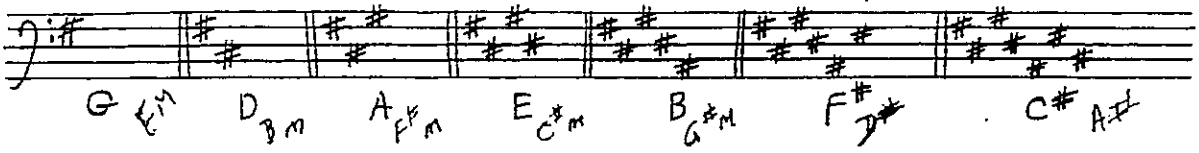
Capital letters indicate name of key.

Small letters indicate the last sharp. Use all the earlier sharps in the order, along with the last sharp.

A key-signature is an abbreviation practice which places constantly needed sharps or flats at the beginning of each staff. A sharp placed on a certain degree means that all octaves of that degree are also to be sharped. For example, if a signature sharp is placed on 5th line F, that refers to all the F's on that staff, high or low.

Here are the conventional placements of signature sharps for all the sharp keys in both treble and bass clefs:





In writing a sharp be sure to center the sharp on its staff degree, to have vertical lines accurately vertical, and to have horizontal lines slanted slightly upward to the right. Each successive sharp must be placed slightly to the right of the preceding sharp.

Use the conventional placement order for key signatures, in the interests of clarity and ease. for example, avoid this:

Wrong; logical, but unconventional, therefore inconvenient to read. A# should go down.

Memorize the order of sharps. Say it rhythmically, "F C G D A E B", repeatedly until it becomes a habit. Or use a mnemonic like "Father can go down and eat breakfast." Or remember that each new sharp is 5 degrees above the last. Notice that the names of keys also move by intervals of 5 degrees.

The tones of a key have technical names:

The first or key-tone is called the tonic, because the key is built around that tone. That tone is syllable "do" in the movable-do system of solfeggio.

The next most important tone in a key is the 5th tone above the tonic. It is called the dominant. This tone is "so" or "sol" in the movable-do system.

The next most important is the subdominant, the 4th tone, found the same distance below the tonic as the dominant is above. (Or, another way to look at it, the tone of which the tonic would be the dominant. It is "fa" in the movable-do system.

Midway between tonic and dominant, we find the mediant, the 3rd tone. It is "mi" in the movable-do system.

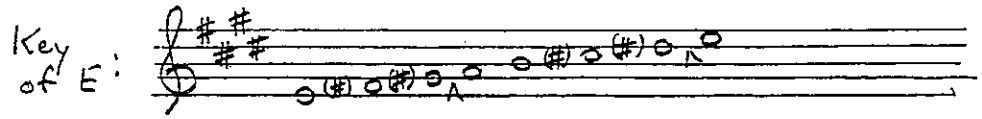
Midway between tonic and subdominant, we find the submediant, the 6th tone. It is "la" in the movable-do system.

The tone just above the tonic, the 2nd tone, is called the supertonic. It is "re" in the movable-do system.

The remaining tone, the seventh, is called leading-tone, or leading-note. This is because its distinctive function is to lead melodically to the tonic. The abbreviation "L.T." is often used for this tone. It is "ti" in the movable-do system.

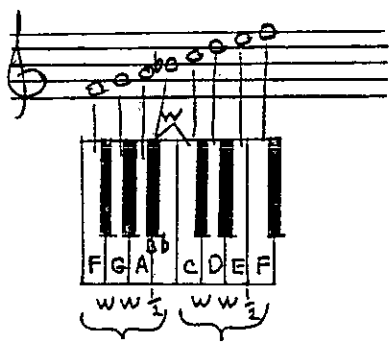
Exercise Ia: (Independent Assignment No. 1 includes above study material and Exercise Ia. Throughout this syllabus, Independent Assignment Numbers are to facilitate evaluation of work done by students in courses organized on an individualized basis.)

Write on a separate sheet of staff paper a scale of one octave in each successive sharp key, including the key of C. Alternate the use of treble and bass clefs. Place little wedges between the tones which are only a half-step apart. Use correct key signatures, and to show that you understand which tones are affected, for this assignment, also place sharps in parenthesis before each note affected. For example:

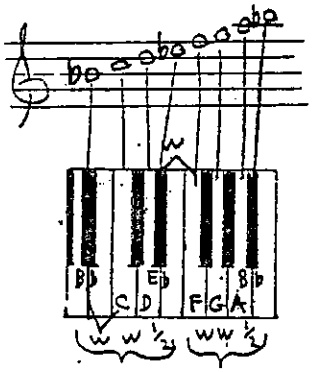


Sound out each of these scales on the piano. There are two reasons for doing this, (1), to see your work visually in the frame of pitch reference represented by the keyboard, and (2), to hear the sounds which the notes you have written represented. It is very important for a musician to constantly develop the inter-associations among these three areas: the ear, the note, and the keyboard. To sing examples is also very useful, especially for those with little or no instrumental background.

Turning back to the circle of keys now, we will consider the flat keys. A flat, symbol "♭", lowers a given pitch one half-step. For instance, B-flat is B lowered one half-step. On the keyboard, the black key just below B will be used in place of B. (Follow this discussion with a keyboard or keyboard chart directly at hand.) Recalling the tetrachordal arrangement of the key of C, suppose we consider the lower tetrachord, C D E F, an upper, and place under it another tetrachord which would be a lower tetrachord to it, remembering that there is to be a whole step between the tetrachords. The tones needed would be F G A B-flat. This required only one alteration, B to B-flat, which happens to be fourth tone of the new scale. (Play the scale.) F being the fundamental, the family of tones just formed would be called the key of F:



If we now take this new tetrachord, F G A B-flat, and consider it an upper, and treat it likewise, we will need B-flat C D E-flat for the next lower, giving us the key of B-flat. The new alteration needed, E-flat, happens to again be the fourth tone. We also need the first flat, B-flat:



We will place these constantly needed flats in a key signature, as we did the sharps.

The patterns shown in the keys of F and B-flat continue throughout the 7 flat keys:

E♭ Major will need old flats B♭ & E♭ and new flat A♭, which is the 4th tone of E♭ Major.

A♭ Major will need old flats B♭ E♭ & A♭ and new flat D♭, which is the 4th tone of A♭ Major.

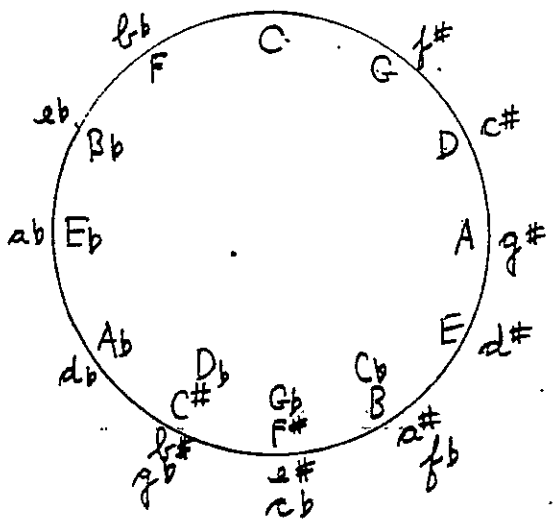
D♭ Major will need old flats B♭ E♭ A♭ & D♭ and new flat G♭, which is the 4th tone of D♭ Major.

G♭ Major will need old flats B♭ E♭ A♭ D♭ & G♭ and new flat C♭, which is the 4th tone of G♭ Major. C♭ is a "white key" flat.

C♭ Major will need old flats B♭ E♭ A♭ D♭ G♭ & C♭ and new flat F♭, which is the 4th tone of C♭ Major. F♭ is a "white key" flat.

A coincidence in flat keys, namely that the key-name is the same as the next-to-last flat is helpful. For example, in D♭ Major, which has 5 flats, the next-to-last flat was D♭.

Below is added the information about the flat keys to the circle of keys we had before. Use this circle for reference now, since it contains all the information about all major keys in both sharps and flats:



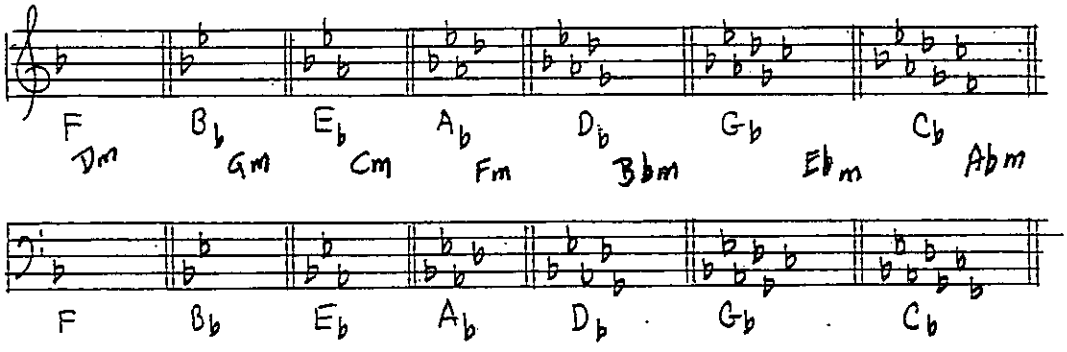
Capital letters indicate name of key. Small letters indicate name of last sharp or flat. Use all the earlier sharps or flats, together with the last.

Notice that the order of flats is just opposite that of the sharps. Notice also that the order of successive keys moving clockwise is the same as the order of sharps, but beginning at a different point on the circle. The same is true of the flats, moving counterclockwise. Notice that everything changes by successive intervals of five tones, called a fifth. (A perfect 5th, as will be explained in Topic III.) Notice that the key name of all flat keys except F corresponds to the next-to-last flat. Notice that the word "flat" in a key-name, like E-flat, D-flat, etc., assures that its signature is made up of flats; that the word "sharp" in a key name assures that the signature is made up of sharps; and that all those with neither in the name have sharps in the signature, except for C and F.

The doubling up at the bottom of the circle of keys conveniently shows what are called enharmonic keys. Enharmonics are tones or groups of tones whose absolute sounds are essentially alike, but whose notation or meaning are different. The key of D-flat is enharmonic to the key of C#; G-flat is enharmonic to F#, etc.

Theoretically, further enharmonic keys would be possible, but they are practically not used. The key of E could have an enharmonic key of F-flat, with 8 flats in the signature (all the single flats with B double-flatted); the key of A an enharmonic of B-double-flat; etc., as far as you wish to go. (A special case, J. S. Bach's Well-Tempered Clavier, Bk. I, Prelude #3 in C# Major, has passages in G# Major and E# Minor, and some other Preludes and Fugues from the Well-Tempered Clavier move temporarily into theoretical keys.)

Here are the conventional placements of signature flats for all the flat keys in both treble and bass clefs:



Exercise Ib (Independent assignment No. 2):

Write on a separate sheet of staff paper a scale of one octave in each successive flat key, including the key of C. Alternate use of treble and bass clefs. Place wedges between tones which are only a half-step apart. Use correct key signatures, and also place the extra flats in parentheses before each note affected.

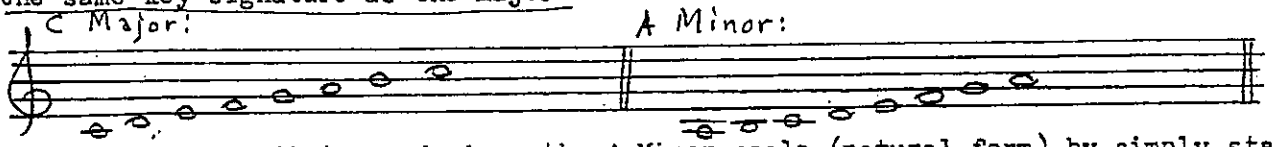
Sound out each of these scales on the piano.

Exercise Ic (Independent assignment No. 3):

Starting at a random position on the circle of keys, write as many keys as you can, moving clockwise around the circle, in a given period of time. 5 minutes is suggested. Write correct key signature, correct notes of the scale, correct label, in one octave only, ascending. Omit the wedges indicating half-steps and the parenthesized sharps and flats. Continue to drill on this until you can do all 15 keys in 5 minutes. When one can do this without significant error, he may presume he knows the major scales and signatures well enough.

The minor mode is very important in music. Three forms (that is, patterns of whole- and half-steps) of the minor scale are commonly taught, natural, melodic, and harmonic. We will be most concerned with the harmonic form. In composer's practice the minor mode is used for contrast with the major.

Each minor scale has a strong relationship to a particular major scale, the relative. The relative minor scale having no sharps or flats in the signature is A Minor. Therefore it is relative to C Major. Here is a comparison of the two, using the natural form of minor. (Refer to your keyboard chart, and follow this discussion on it.) The relative minor scale of a given major is that which has the same key signature as the major.



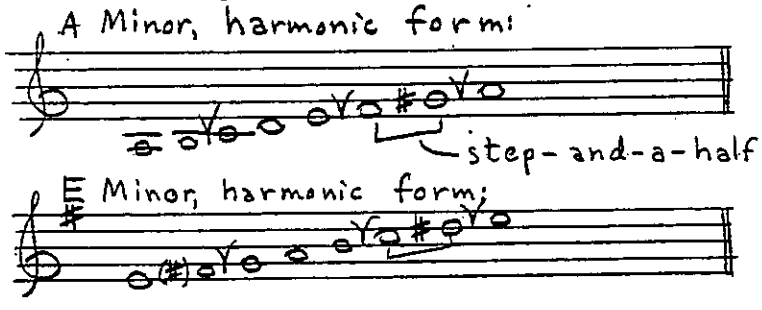
Notice that one derives the A Minor scale (natural form) by simply starting and ending on the submediant (6th) tone of the C Major.

Applying these procedures to G Major, we find that E Minor is its relative, E being the submediant of G Major. as shown:

In each of the other cases, too, the relative minor key tone is the 6th tone of the given major.

In musical literature of the common-practice period examples of natural minor are infrequent, and even when they appear, most musicians consider them Aeolian, a modal scale to be discussed presently. The form of vastly greater use is the harmonic form. It varies in pattern from the natural minor only in that the leading-tone (7th tone) is raised a half-step by an accidental, bringing it within a half-step of the tonic. An accidental is a sharp, flat or natural not called for by the signature.

Here are examples of harmonic form minor:



Sound out these scales on the piano.

Notice that there are now 3 half-steps in the scale, and one interval of a step-and-a-half, called an augmented second (to be explained in the next topic).

Half-steps fall between 2 & 3, between 5 & 6, and between 7 & 8. A step-

and-a-half falls between 6 & 7.

Perhaps the biggest reason that it is desirable to raise the leading-tone is that it needs to be nearer the tonic to function as a leading-tone. Examination of music in minor keys will show that a part rarely moves scale-wise through the sixth and seventh tones in either direction; more often the submediant moves to the dominant and the leading-tone moves to the tonic. When a part does move through the 6th and 7th tones, the melodic minor form is usually applied. That will be explained presently. The harmonic form is so useful and frequent that minor keys called for are assumed to be in harmonic form if the form is not otherwise stipulated.

As we showed on the previous page:

A Minor is relative to C Major, which has no sharps or flats in its key signature. The raised leading tone in the harmonic form is G#.

E Minor is relative to G Major, which has one sharp in its key signature. The raised leading tone in the harmonic form is D#.

Continuing in like manner:

B Minor is relative to D Major, which has two sharps in its key signature. The raised leading tone in harmonic form is A#.

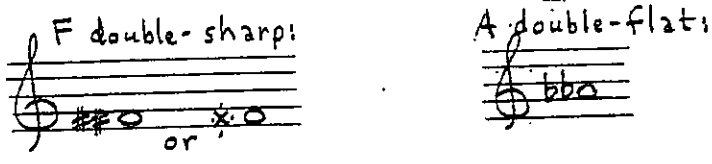
F# Minor is relative to A Major, which has three sharps in its key signature. The raised leading tone is E#.

C# Minor is relative to E Major, which has four sharps in its key signature. The raised leading tone is B#.

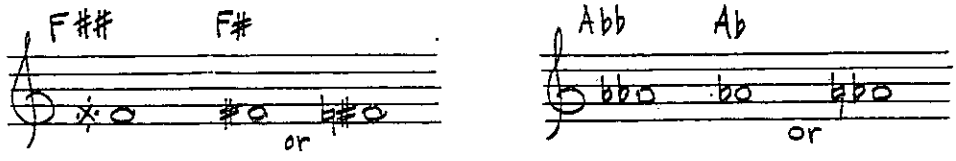
G# Minor is relative to B Major, which has five sharps in its key signature. The raised leading tone is F double-sharp (F𝄪). The double-sharp is necessary because the leading-tone degree was F# before raising it, according to the key signature, and we therefore need F sharp-sharp, or F double-sharp.

A double-sharp may be written with two sharps close together on the same degree, or with a special sign, 𝄪 or x .

Later on, we will also need double-flats. There is no special sign for double-flat. Examples:



To indicate changing a double-flat to a single-flat, simply write the single-flat. To indicate changing a double-sharp to a single-sharp, simply write the single-sharp. Optionally, you may place a natural along with the single:



Continuing:

D♯ Minor is relative to F♯ Major, which has six sharps in its key signature. The raised leading-tone is C double-sharp.

A♯ Minor is relative to C♯ Major, which has seven sharps in its key signature. The raised leading-tone is G double-sharp.

In the flat keys:

D Minor is relative to F Major, which has one flat in its key signature. The raised leading-tone is C♯.

G Minor is relative to B-flat Major, which has two flats in its key signature. The raised leading-tone is F♯.

C Minor is relative to E-flat Major, which has three flats in its key signature. The raised leading-tone is B-natural, because the scale-tone before raising was B-flat. (B-flat is one of the three flats.)

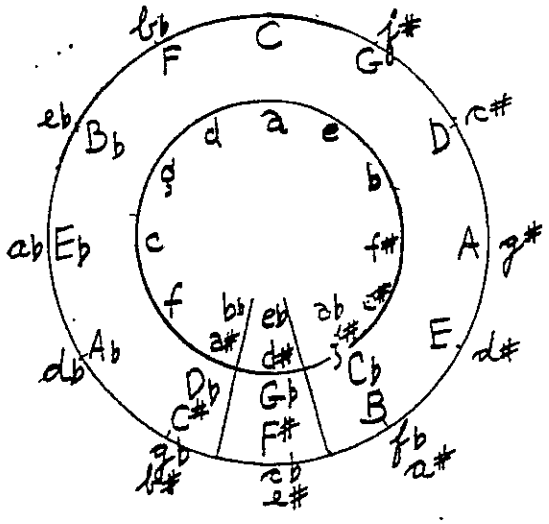
F Minor is relative to A-flat Major, which has four flats in its key signature. The raised leading-tone is E-natural, because the scale-tone before raising was E-flat.

B-flat Minor is relative to D-flat Major, which has five flats in its key signature. B-flat is the name of this key, not B, because the sixth tone of the scale of D-flat Major is B-flat. Be careful not to call it B Minor, because there is already a B Minor scale, having two sharps in its key signature. The raised leading-tone in B-flat Minor is A-natural.

E-flat Minor is relative to G-flat Major, which has six flats in its key signature. The raised leading-tone is D-natural.

A-flat Minor is relative to C-flat Major, which has seven flats in its key signature. The raised leading-tone is G-natural.

Again the circle of keys is the best way to diagram these relationships. We will use an inner circle within the previous one so that this one illustration may now include all the appropriate cumulative information in one place:



It is customary to abbreviate major keys by the capital letter standing alone, and minor keys by the small letter standing alone.

Sound out each minor scale on the piano.

(Independent assignment No. 4 consists of reading the above material with understanding, and sounding each scale at the keyboard.)

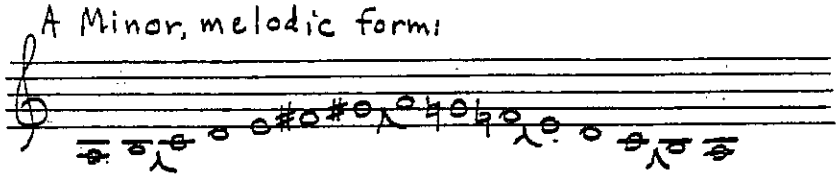
Exercise IIa (Independent assignment No. 5):

Write minor scales in all 15 keys harmonic form. Alternate treble and bass. Use the correct key signatures, place wedges to indicate half-steps, and place the bracket to indicate a step-and-a-half. You need not use parenthesized sharps and flats in writing scales from now on.

Exercise IIb (Independent assignment No. 6):

Starting at a random position on the circle of keys, write as many minor scales (harmonic form) as you can in 7 minutes. Write the correct key signature, correctly labelled, the scale tones, and the correct raised leading tone accidental.

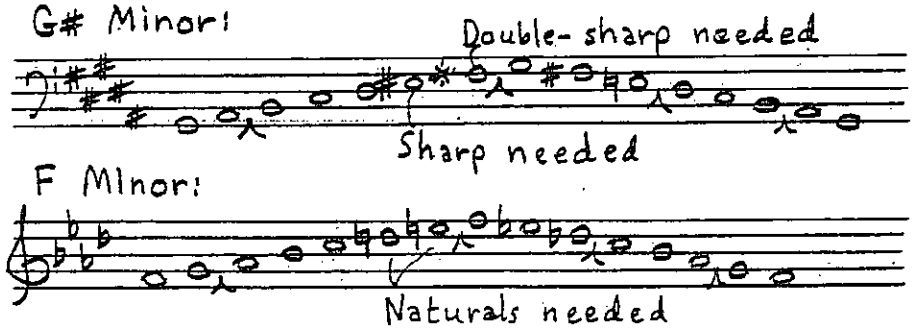
The remaining of the three forms is the melodic. It is sometimes used when a part (that is, melody) moves through the 6th & 7th tones. When ascending, the 6th & 7th are raised (with reference to the key signature), and when descending, both 6th & 7th are lowered back as they are in the signature:



Play this scale.

Notice that half-step placements are different in ascending and descending forms.

Sometimes raising the 6th & 7th tones will require naturals, sometimes sharps, sometimes double-sharps; sometimes the accidental for the 7th will differ from that of the 6th:



Besides the relationships called relative, there is another important relationship between major and minor called parallel.

Remember that the relative major of a given minor had the same key signature, but a different tonic (for example, the relatives D Major and B Minor have

the same signature, but different tonics). Now the parallel (tonic) minor has the same tonic, but different signatures. C Major and C Minor are parallel; F Major and F Minor are parallel, etc. Later in our study, when we consider Modulation, we will discover that parallel major and minor keys tend to merge into one whole key, making their distinction almost insignificant.

Exercise IIc (Independent assignment No. 7 includes the above study material and this exercise.):

Write minor scales in all 15 keys, melodic form, in one clef for each key, that clef in which you need the most practice. Use correct key signatures. No time drill is necessary for writing melodic minor scales. Play 5 or 6 of these scales, more if needed, to assure that you are familiar with their sound.

Exercise IIx (extra, optional) (Independent assignment X):

Write an original melody about 8 measures long. A melody has a character of its own; firm rules cannot be laid down for melodies, but as suggestions for your guidance, consider the following:

1. In general, most beautiful melodies move stepwise or in small skips most of the way, with one or two interesting larger skips.

2. All musical utterances are inevitably in phrases. 8 measures is conveniently, but not necessarily, about enough in length for two balancing phrases. The best guide for length of a phrase is the length of the human breath. A phrase has a curve of tension, typically rising to a point, then falling.

3. In general, melodies begin on the tonic, or on the mediant or dominant. Typically, the first phrase, if you have two, usually ends on the dominant, leading tone, or supertonic, thus giving the phrase a questioning aspect; then the second phrase answers the question by ending on the tonic.

Modal Scales:

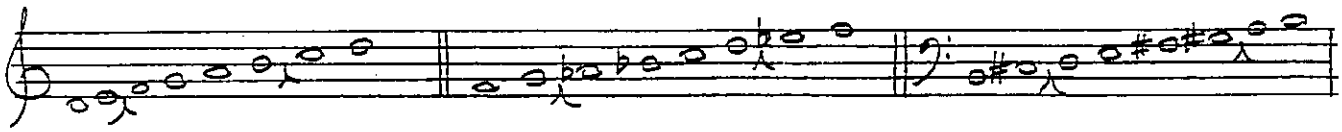
A consideration of modes and modal scales is important for understanding musical literature from times earlier than the 17th century, and because contemporary music makes considerable use of modes. Major and minor modes grew from these earlier modes.[1]

All Western World scales, modal, major and minor, are based on the diatonic scale inherited from the Greeks, that is, the particular order of half and whole steps which is found on the white keys of a keyboard. But the various modes use different points of orientation and centering. Church modes, from which the others are descended, were codified about the 8th century A.D., and for most of the middle ages there were 8 modes, 4 of which were adaptations of the other four. These four basic modes, called authentic, were Dorian, Phrygian, Lydian and Mixolydian. In the 16th century, two additional modes were added, which together

1 See Harvard Dictionary, pages 421 and 452
See also Curt Sachs "The Road to Major" (Musical Quarterly, vol. xxix, no. 3)

with the four mentioned, gave us six modes. The two additional ones were Aeolian and Ionian. Clear understanding of the distinctions among these six modes is sufficient for the beginning theory student:

(1) Dorian is the mode whose whole and half step pattern corresponds to that between any D and the D an octave higher on the keyboard, thus having half-steps between 2 & 3, and 6 & 7:

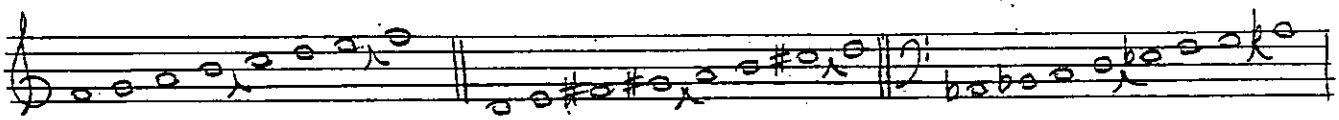


If you are familiar with movable-do syllables it is easy to remember that the syllables from re to re will always give a Dorian pattern, whatever the signature.

(2) Phrygian is the mode whose whole and half step pattern corresponds to that between E & E, with half-steps between 1 & 2, and 5 & 6:

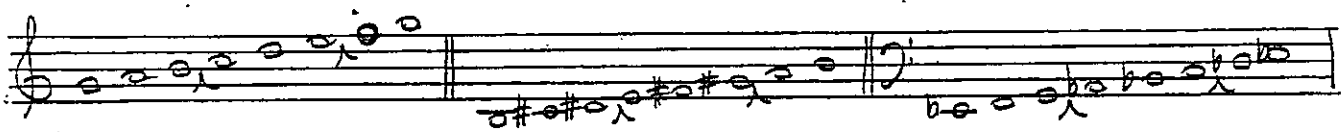
In syllables, this sounds like mi to mi.

(3) Lydian is the mode whose whole and half step pattern corresponds to that between F & F, with half steps between 4 & 5, and 7 & 8:



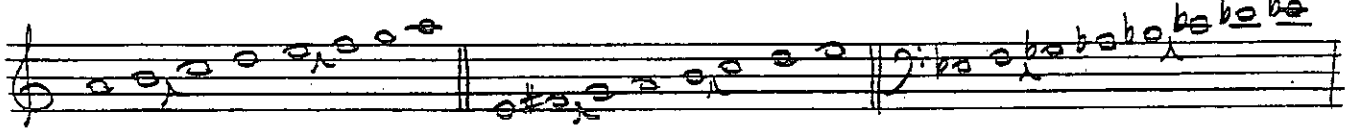
In syllables, this is like fa to fa.

(4) Mixolydian is the mode whose whole and half step pattern corresponds to that between G & G, with half steps between 3 & 4, and 6 & 7:



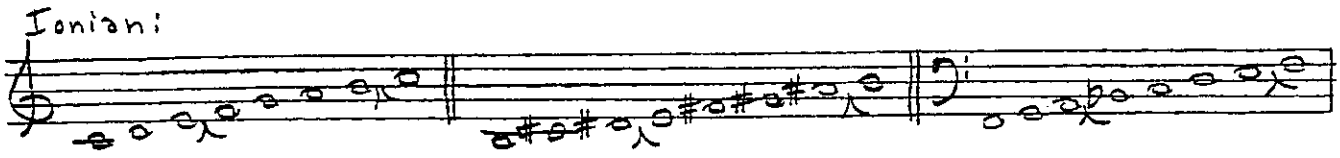
In syllables, this is like so to so.

(5) Aeolian is identical in pattern to our natural minor scale, like A to A on the white keys, with half steps between 2 & 3, and 5 & 6:



In syllables, this is like la to la.

(6) Ionian is identical in pattern to our major scale, with half-steps between 3 & 4, and 7 & 8:



As a further aid to remembering these, each mode has a characteristic tone which pins it down in one's mind:

(1) The Dorian sounds like a natural minor scale with the 6th tone too high. (This is referred to as a "Dorian 6th" occasionally.)

(2) The Phrygian doesn't sound much like either major or minor. Its characteristic tone is the second, a half step above the final. This particular fact imparts a flavor which is not elsewhere duplicated in music. The major-minor system was unable to really preserve the Phrygian mode, and its beauty was mostly lost when that system prevailed.

(3) The Lydian's characteristic tone is its raised fourth. It sounds like a major with the 4th too high, or like a beginner at the piano trying to play the F major scale and forgetting to flat the B.

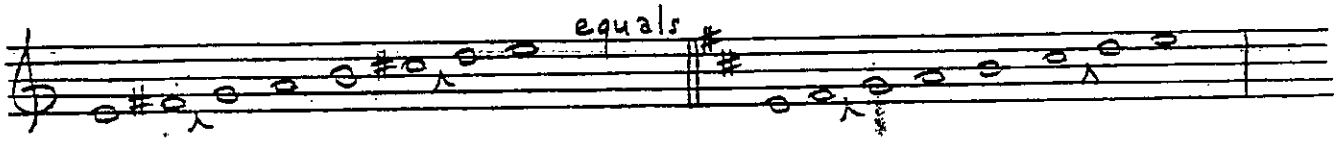
(4) The Mixolydian's characteristic tone is its lowered seventh. It sounds like a major with the seventh too low, or like a piano beginner who fails to sharp the F when playing the G major scale.[1]

A mnemonic to help in remembering the order of the modes is "Don't play lousy music." (Dorian, Phrygian, Lydian, Mixolydian.)

You may notice that there is one possibility of half and whole step arrangement which has not been used, that from B to B. Because of the tritone relationship of final to dominant, this was not used in any practical way, so this author doesn't recommend learning it. It was called Lochrian by theorists.

Perhaps the possibility of using key signatures with modes has occured to the student. This is all right to do, even though it was not done during the middle ages. If this is desired, simply use the signature which will give the number of flats or sharps needed if the scale were written out. For example:

Dorian on E may use a 2-sharp signature:



Lydian on B-flat may use a 1-flat signature:

1 See Richardson, A. Madely, The Medieval Modes, published by G. Schirmer, for an excellent treatment of modes for the modern musician.

(Independent assignment No. 8 consists of study of the preceding material.)

Exercise IId (Independent assignment No. 9):

Write, on separate staff paper, Dorian scales on G & F#; Phrygian on F and D#; Lydian on C & B-flat; and Mixolydian on A & A-flat. Use signatures or not, as you choose. Place wedges in half-step intervals.

Exercise IIx (Independent assignment X):

Listen to recordings of music written between the 6th and the 16th centuries.

Exercise IIx (another) (Independent assignment X):

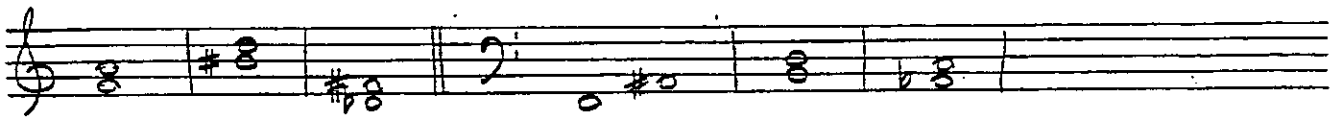
Write an original melody in a mode. Be sure that the final tone is either the lowest or highest of the modal scale.

Topic III - Intervals; Acoustics

The distance between two musical tones is called an interval. If one tone is sounded after the other, the interval is called melodic. If the tones are sounded simultaneously, the interval is called harmonic. It will be evident that the interval is the basic building block of all pitch relationships if we realize that all musical lines (melodies) are made up of successive melodic intervals, and all chords or vertical combinations are made up of combinations of harmonic intervals. The character of music is dependent on the respective characters of its intervals.

The term step denotes an interval involving one staff degree's distance, that is, a half or a whole step, and the term skip means any interval larger than a whole step.

Intervals are labelled by a general term and by a specific term. The general term is always an ordinal number, like 2nd, 3rd, etc. The ordinal number depends only upon the number of degrees on the staff which are spanned by the interval as written. The initial degree is counted as one. For example, these are all 3rds, since they span 3 staff degrees, even though they vary in specific size:



Instead of "first" we use the term "prime" or the term "unison". Instead of "8th" we use the term "octave".

These are examples of prime or unison, second, fourth, fifth, sixth, seventh, and octave, respectively:

An arabic numeral is an acceptable abbreviation for these ordinal numbers, as seen under each example above.

Regarding the specific term, one of the other of two sets of specific terms is used. One set, "Perfect, diminished, or augmented", is used only with primes, 4ths, 5ths and 8ves; the other set, "Major, minor, diminished, or augmented", is used only with 2nds, 3rds, 6ths, and 7ths. This is largely for historical reasons. In earlier times the more purely consonant intervals were considered "perfect", and the others were considered "imperfect".

"Major" and "minor" refer only to the size of intervals, meaning "large" and "small". There is no particular mode or quality implied.

These terms compare to each other as follows:

A perfect interval made a half-step smaller becomes "diminished".

A perfect interval made a half-step larger becomes "augmented".

The converse of each of these is also true, for example, a diminished interval made a half-step larger becomes perfect.

This can be diagrammed as follows:

d ⟷ P ⟷ A (toward the right means larger)

With the other intervals:

A major interval made a half-step smaller becomes "minor".

A minor interval made a half-step smaller becomes "diminished".

A major interval made a half-step larger becomes "augmented".

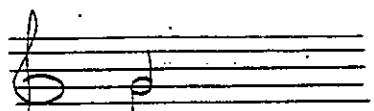
This can be diagrammed as follows:

d ⟷ m ⟷ M ⟷ A

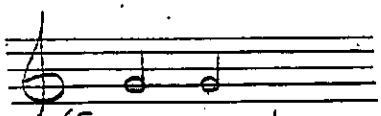
Notice that any of 4 specific terms may be applied to 2nds, 3rds, 6ths and 7ths; but that any of 3 specific terms may be applied to primes, 4ths, 5ths and 8ves. We never call primes, 4ths, 5ths, or 8ves "major" or "minor", and we never call 2nds, 3rds, 6ths, or 7ths "perfect". "Diminished" and "augmented" are used with all intervals.

Now here are the standard or reference sizes of the respective intervals:

1. A perfect prime (or unison) is so called when two tones are on exactly the same pitch:

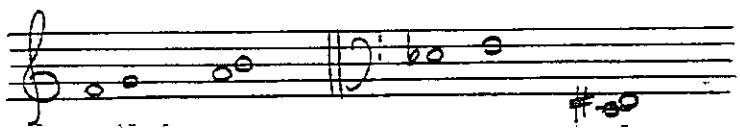


(Two voices on same pitch)



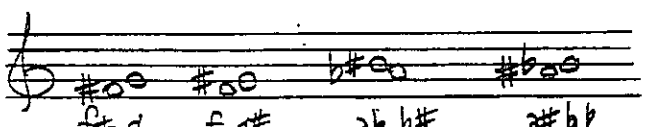
(Successive tones of one voice)

2. A second is called major (never perfect) when it is one whole step wide:

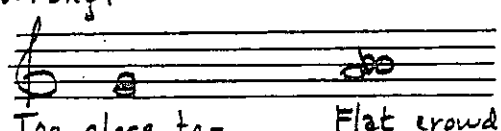


When writing a second to be sounded harmonically (simultaneously) the note-heads must be staggered to help the eye to readily distinguish between 2nd and 3rd. The accidentals for each note-head are placed ahead of both together, showing by their accurate placement on the staff which note-head they belong to.

Correct:



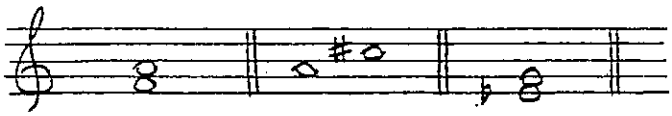
Wrong!



Too close together; looks like a 3rd

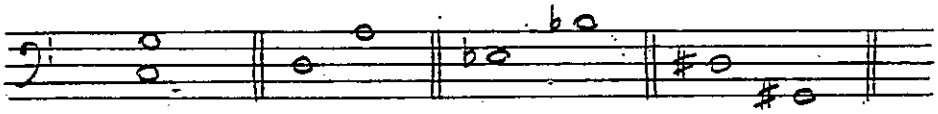
Flat crowded between note-heads

3. A third is called major (never perfect) when it is two whole-steps wide:



4. A fourth is called perfect (never major) when it encompasses one half-step and two whole-steps:

5. A fifth is called perfect when it spans one half-step and three whole-steps:



6. A sixth is called major (not perfect) when it spans one half-step and 4 whole-steps:

7. A seventh is called major when it spans one half-step and five whole-steps. But it will probably be easier to count it a half-step less than the size of a perfect octave:

To summarize, 4ths, 5ths, 6ths, and 7ths are either perfect or major, whichever is appropriate, when there is <u>one</u> half-step, and the <u>rest</u> of the steps needed are whole.

Observe that an interval is either major or perfect, whichever is appropriate, if the upper tone is in the major scale of the lower. This fact is used by some students to measure intervals, but this practice is too dependent on considering the lower tone constantly as a tonic, an artificial situation. Interval relationships are much more than relationships to a lower tonic only.

We said above that a given interval which is a half-step smaller than major is called minor. Therefore, a second which is only a half-step wide instead of a whole-step, a third which is only a step-and-a-half wide instead of two whole steps, etc., are called minor. Here are some examples: (next page)

Examples of minor, diminished and augmented intervals:

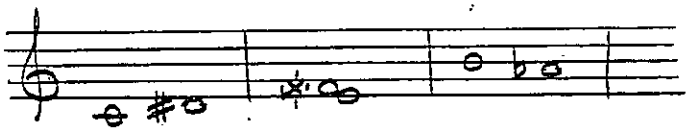
Seconds:

Minor: (one half-step wide, since they are to be a half-step smaller than a major second, which is a whole-step wide)

Diminished seconds (zero distance wide, since they are to be a half-step smaller than a minor second):

The diminished second is the same size as a perfect prime, but it is <u>not</u> a perfect prime, because it is spelled as a second. The diminished second is said to be <u>enharmonic</u> to a perfect prime.

Augmented seconds ($1\frac{1}{2}$ steps wide, since they are to be a half-step larger than a major second):

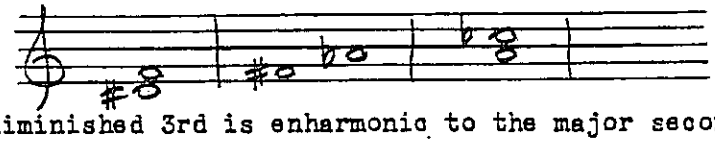


The augmented second is <u>enharmonic</u> to a minor 3rd. It is <u>not</u> a minor 3rd.

Thirds:

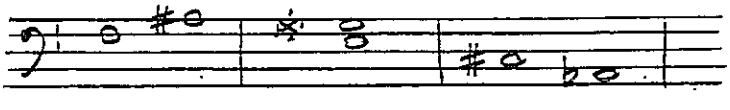
Minor 3rds ($1\frac{1}{2}$ steps wide -- $\frac{1}{2}$ step smaller than major 3rd):

Diminished 3rds (1 step wide -- $\frac{1}{2}$ step smaller than minor 3rd):



The diminished 3rd is enharmonic to the major second.

Augmented 3rds ($2\frac{1}{2}$ steps wide -- $\frac{1}{2}$ step larger than a major 3rd):



The augmented 3rd is enharmonic to the perfect 4th.

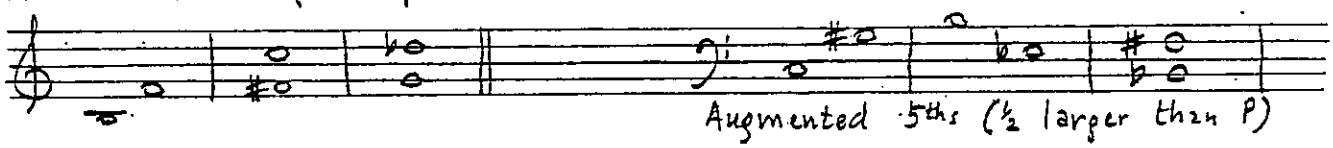
Fourths:

Diminished fourths (½ step smaller than Perfect):

The diminished 4th is enharmonic to the major 3rd.
The augmented 4th is enharmonic to the diminished 5th. The term "tritone" means either augmented 4th or diminished 5th.

Fifths:

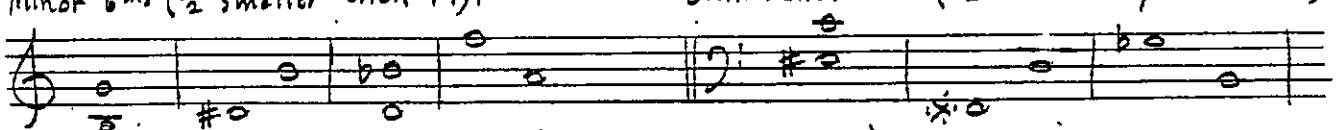
Diminished 5ths (½ step smaller than P):



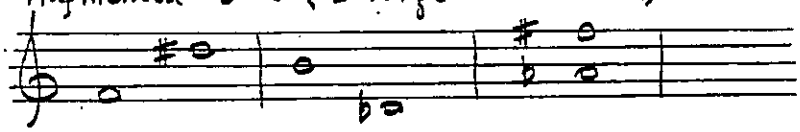
The diminished 5th is enharmonic to the augmented 4th. Both may be called "tritone".

Sixths:

Minor 6ths (½ smaller than M): Diminished 6ths (½ smaller yet than m):



Augmented 6ths (½ larger than M6):



The minor 6th is enharmonic to the augmented 5th.
The diminished 6th is enharmonic to the perfect 5th.
The augmented 6th is enharmonic to the minor 7th.

Sevenths:

Minor 7ths (½ smaller than M): Diminished 7ths (½ smaller yet):

Augmented 7ths (½ larger than M):

The minor 7th is enharmonic to the augmented 6th.
The diminished 7th is enharmonic to the major 6th.
The augmented 7th is enharmonic to the perfect 8ve.

Octaves:

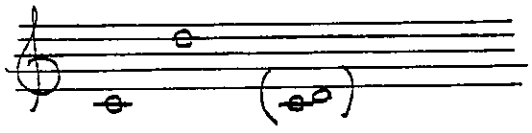
Diminished 8ve (½ smaller than P): Augmented 8ve (½ larger than P):

The diminished octave is enharmonic to the major seventh.

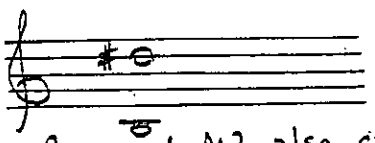
Capital M is the accepted abbreviation for "major", small m for "minor", capital A for "augmented", and small d for "diminished". Exaggerate the difference when writing your capital and your small m's. They are easily confused.

Diminished primes would be absurd, because the perfect prime already has tones which have no distance between them. Simply omit diminished primes.

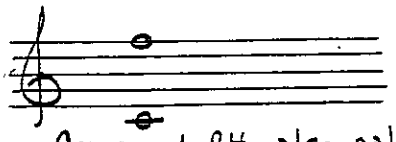
Intervals larger than an octave are called compound intervals, and are named as if transposed within an octave, but some may also be called by other terms. The intervals we discussed earlier, an octave or less wide, are called <u>simple</u> intervals. Here are some examples of compound intervals:



(Called compound M2 because when transposed within an octave, would be a M2. It may also be called a M9 because it spans 9 degrees.)



Compound M3, also called M10



Compound P4, also called P11

Compound 5ths are sometimes called twelfths, especially in counterpoint, and we sometimes hear the terms 13th and 15th when referring to the building of complex tertian chords, but the term 14th is apparently not in common usage.

Intervals classified as consonances include perfect intervals and major and minor 3rds & 6ths; intervals classified as dissonances include any 2nds & 7ths and all diminished and augmented intervals. These classifications are accepted universally in the common practice period, although in a larger view consonance and dissonance really are relative terms whose norm of distinction is subject to change.

(Independent assignment 10 consists of studying material from the beginning of Topic III to this point.)

Exercise IIIa (Independent assignment 11):

Write M, m, d, & A 2, 3, 6, & 7 above and below C, in either clef. This means write M2 above C, then m2 above C, then d2 above C, then A2 above C; then write M2 below C (write whatever tone below C would be a 2nd away and would

be a whole step, in other words, B-flat), m2 below C, etc.; do the same with 3rds, 6ths and 7ths respectively. This adds up to 32 intervals. When altering intervals by accidental, be sure to leave the original note unaltered. For example, if you add an accidental to change the M2 above C to m2, add it to the D and not to the C.

Write P, d, & A primes, 4, 5, & 8 above and below G#. Omit diminished primes. This will make 22 more intervals. Work at a keyboard if at all possible, and play each interval written, or think the sound for each interval written if you are sure you are able to do that accurately.

Ear Activities:

In our preface we mentioned the importance of developing ear, eye, and keyboard skills concurrently with study of the written music. Careful ear training in intervals is fundamental to all music. The same is true of sight-singing. Sight-singing is the inverse of ear training. In sight-singing one supplies the sound for a given symbol, and in ear training one supplies the symbol for a given sound.

We aim to be able to see with our ears, and to hear with our eyes. Both processes require a clear concept of the particular item under examination; practicing both alternately are important exercises for achieving that clarity; and ability to do both is usually proof that the student has achieved that clarity.

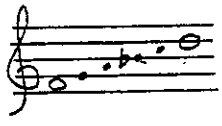
Learning to hear is a highly individual matter, but here are some suggestions which have been found useful by many students:

1. Learn first to dependably distinguish between a whole step and a half-step, both ascending and descending. A surprising number of potentially good musicians who have developed a considerable amount of technical proficiency in their media are not clear about this distinction.

When drilling individually, go to a practice room with a piano, play any tone in your comfortable range, sing that tone plus another tone a half-step or whole-step above or below it, then play the new tone after singing it, to check yourself. This activity is also useful in a class.

Gradually widen the distance of examples drilled until all the intervals are included. Select your own proper pace for this growth, adding wider intervals rapidly enough to be a challenge, but not so rapidly as to confuse yourself. Use descending intervals as often as ascending. Progress normally seems slow in this endeavor. This will probably take several weeks or even months. Don't be discouraged, but do concentrate when drilling. It is not unusual for very good potential musicians to have difficulty with ear training, and the reward is in your increased hearing power and awareness of the structure of music. Supplement this drill approach with the following suggestions and any others you may find useful.

2. Fill in the space between tones mentally, thinking up or down the scale. For instance:

If is played, think:  , noticing

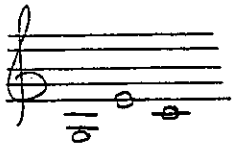
that one half-step only was encountered and 6 degrees were spanned, therefore the interval is a M6.

3. Associate melodic intervals with folk tunes or other familiar motives. Here is a list of some that have been found useful. Of course, only those intervals are useful to a given individual that are very familiar to him:

(a) Down m3: "Cuckoo", or first two notes of "Star-Spangled Banner", or the first skip of "Silent Night".

(b) Up m3: 1st skip of Brahms's "Lullaby"; 1st two notes of "Rock-aBye, Baby, On The Tree-top".

(c) Down M3: "Good-night, Ladies"; 2nd and 3rd tones of NBC chime:



"Who Is Sylvia" by Schubert; "Blest Be The Tie That Binds" (Hymn tune).

(d) Up M3: "Old Black Joe"; 1st two tones of "Mess-call", traditional bugle call; first two tones of Beethoven's "Eroica" Symphony theme.

(e) Down P4: Anvil Chorus from Verdi's "Il Trovatore"; 1st skip of "O Come, All Ye Faithful"; "Hallelujah" from Messiah by Handel.

(f) Up P4: Bridal Chorus from Wagner's "Lohengrin"; "Auld Lang Syne"; "Sweet and Low"; "Taps".

(g) (We have not discovered any familiar tune which begins with descending tritone.)

(h) Up a tritone (A4 or d5): "Maria", from Bernstein's "West Side Story"

(i) Down P5: Fog-horn frequently tuned to descending P5; 1st and 3rd notes of "Dixie"; 1st and 3rd notes of "Star-Spangled Banner".

(j) Up P5: "All Glory, Laud and Honor", chorale by Teschner; 1st notes of horn-call from Siegfried by Wagner; 1st & 3rd notes of "Holy, Holy, Holy", hymn.

(k) Down m6: "O, Zion Haste", gospel hymn tune; 2nd and 3rd tones of love theme from Tschaikowsky's "Romeo and Juliet".

(l) Up m6: "Hearts and flowers", tune used in melodramas; "Go Down, Moses", spiritual.

(m) Down M6: "Nobody Knows the Trouble I've Seen", spiritual; "Salut d'Amour" (Love's Greeting) by Elgar.

(n) Up M6: NBC chime (see example under (c) above); "It Came Upon The Midnight Clear"; "There's Music in the Air"; "Sweet Genevieve".

(o) Down m7: "None But The Lonely Heart", song by Tschaikowsky.

(p) Up m7: "Somewhere", from Bernstein's "West Side Story".

(q) (We have not discovered any familiar tune which begins with descending M7.)

(r) Up M7: "O Terr' Adio" from conclusion of Verdi's "Aida".

4. Use prepared drill tapes and records, commercially recorded, or recorded by your instructor especially for your use, such as:

(a) This author's "Theory Practice Record", recorded in 1956 by National Music Camp, and available from them, consisting of progressively arranged intervals with correct answers given, designed for individual self-drill.

(b) Interlochen Arts Academy tapes for the Ear Training Laboratory, arranged for individual self-drill with tape machine operated by individual student. This equipment resembles a "language lab". Tapes cover every individual need, general and specific, being especially adaptable to individual needs. They are sometimes coupled with an electronic piano through earphones connected by patch cable to both the tape recorder and the electronic piano so that a number of students can work in the same room without disturbing each other, and so that students can "try over" their answers at the keyboard. This arrangement could be duplicated by any theory teacher.

(c) Rutgers University series of ear training records.

(d) Bockmon & Starr: Perceiving Music: Problems In Sight And Sound, Harcourt, Brace & World, Inc.

Regarding drill of harmonic intervals, the aural impact of harmonic intervals is essentially different from that of melodic. The difference is far-reaching, melodic intervals pertaining to the horizontal (melodic) in music, and harmonic intervals pertaining to the vertical (harmonic).

The harmonic intervals fall naturally into three groups, and awareness of these groups is a help. The student should first decide in which group an interval belongs, then which specific interval in the group:

(a) The perfect consonances; P4, P5, and P8, are similar to each other in a "family resemblance" way that is difficult to describe in words. Students find some of these words helpful in distinguishing this group: open, empty, clean, dry, sterile. We will refer to this group as the "open" group.

(b) The imperfect consonances, M3, m3, M6, & m6, are similar to each other. Helpful descriptive terms are: smooth, complete, full. We will refer to this group as the "full" group. After determining that an interval belongs to this group, a student will decide whether it is the wide one in this group, the 6th, or the narrow, the 3rd. Then he attempts to distinguish the final fine degree, major or minor.

(c) The dissonant intervals are perhaps the easiest to distinguish. They include M2, m2, M7, & m7. We will refer to this group as the "dissonant" group. Students decide whether wide or narrow (7th or 2nd), then whether sharp

(M7 or m2) or mild (m7 or M2).

(d) The tritone is in a class by itself. Though classed as a dissonance, it is not very dissonant, but neither is it consonant. It has a special color or quality which is usually not very difficult to recognize and remember with a little practice.

There is no serious objection to mentally separating the tones of a harmonic interval into a melodic one. However, that is not the way harmonic intervals operate in music, and it is therefore somewhat artificial.

The consonant intervals are considerably aided by chord study. Perhaps it is well to concentrate on melodic interval drill first for this reason. However, harmonic intervals should not be completely omitted at this stage.

(Independent assignment 12 consists of studying the preceding material on hearing intervals.)

Ear Activites:

As we have said, careful programs of ear training and sight-singing should run concurrently with study of this syllabus. Summaries of this author's ear training and sight-singing plan follow, as a suggestion, but since ear training is such an individual matter, its adaptation is left to the instructors or individuals using the syllabus.

Generally, emphasis should be placed on intervals until the student can identify by ear 90% of intervals played at random, both melodically and harmonically, both ascending and descending. However, simple melodic dictation and sight-singing can be begun.

When Topic V, Triads and Qualities, is completed, triad quality dictation (M, m, d, & A) should be added, but interval and melodic dictation should be alternated with triad qualities, and each should be continued until the student can hear each satisfactorily, and even then they should be reviewed from time to time.

When Topics VI, Triad Functions, and IX, First Inversions, respectively, have been assimilated, Triad Functions dictation and Soprano, Bass and Chords dictation, respectively, should be begun. They will be explained in detail at that time.

Melodic dictation continues more or less throughout the study of Theory, since melodies difficult enough to challenge any student can nearly always be found.

Suggested Goals for Ear Training Activities:

1. Intervals: To achieve the ability to identify 90% of intervals heard, including both melodic and harmonic intervals.

2. Harmonies:

(a) To identify 90% of major or minor triads out of random groups of major, minor, diminished and augmented triads: to distinguish between 75% of diminished or augmented triads played at random.

(b) To identify 90% of root position I, IV, & V triads played in any key, major or minor mode.

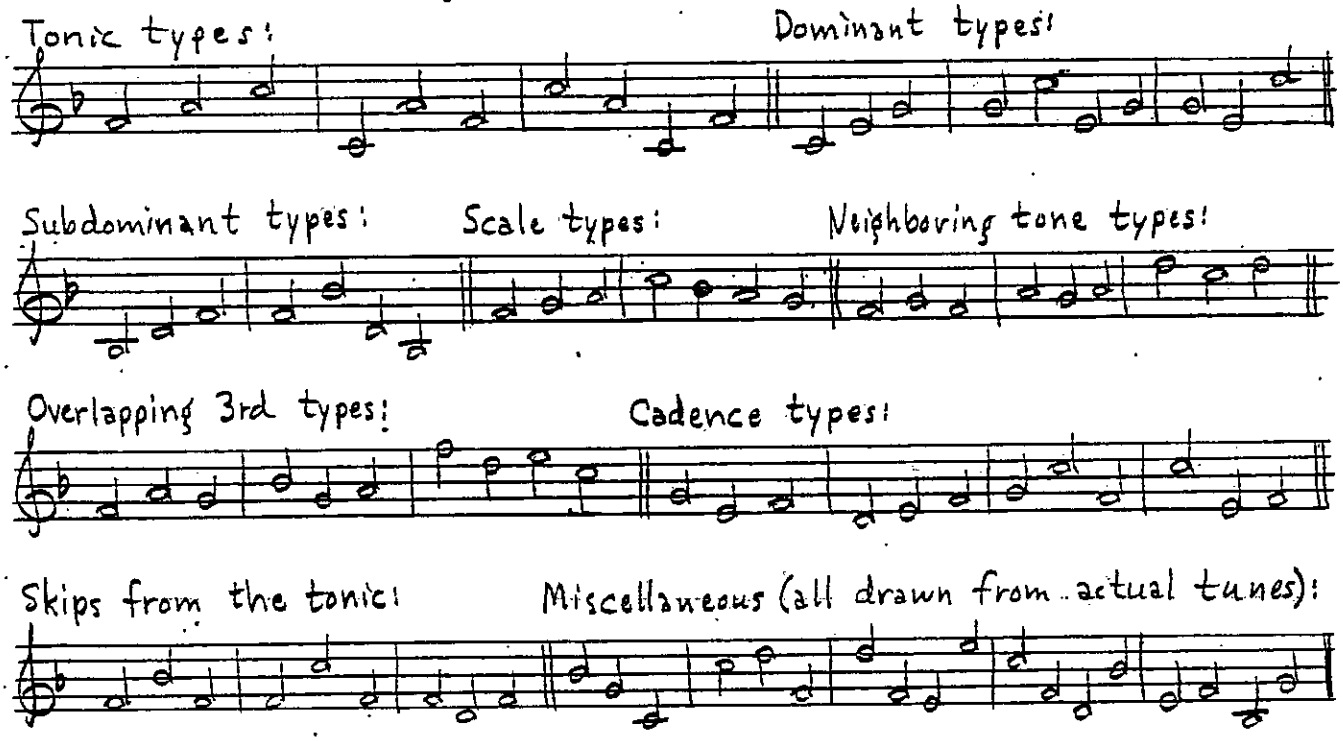
(c) To identify 90% of roots, thirds or fifths heard in the bass or soprano in any triad.

3. Melodies and Rhythms: To satisfactorily write the notation of major, minor, modal and contemporary melodies played, which include any interval problems, any triad skips, any simple or compound meters, and any beat divisions in duplets, triplets, and quadruplets, and usual combinations thereof, such as and

Suggested Goals and Activities in Sight-Singing:

After students are well on their way to learning to sing intervals accurately, this author uses drills in short tonal groups which are basic to melody, abstracted from folk-song and other simple tune sources. We have 85 of these 3-, 4-, or 5- tone groups in the major mode, and 69 in the minor, in 9 categories.

Here are some samples:



Syllables are introduced at this point, along with number-tones. The movable-do system of John Curwen is taught first, but the fixed-do system so widely used in Europe is also introduced later. A reasonable acquaintance with all these widely-used systems is important as information to every music student.

Students who come to a Music Theory course can usually learn to conceive pitches read more easily without a new system, because they come with some frame of pitch references already established, such as the keyboard or the keys of their wind instrument. Learning a new table of intermediate associations is not helpful

to them in any practical way for themselves. However, the manipulation practice involved in learning the 3 intermediate association systems mentioned is valuable for clarifying relationships, and is important general information for musicians.

Primary importance is placed on ability to sound the music accurately. Ability to sing syllable and number systems is secondary to that.

Once the tonal patterns are reasonably under way, melodies, rounds, canons and ensemble materials from various sources are used thereafter. As much as is convenient, sight-singing examples are coordinated with topics which a majority of the class have been considering recently.

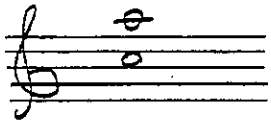
In a normal week of five 40-45 minute periods, the first 15 minutes of 3 days are spent in ear training, and a similar period of the other 2 days are spent in sight-singing, leaving 25-30 minutes each day for study or lecture.

In sight-singing examinations, this author has individual interviews in which the student sings a selection, first with neutral syllable, second with whichever syllable or number systems are under consideration at the time. The student may make repeated attempts at any given spot until he is satisfied. The instructor corrects immediately those errors which affect the remainder of the example, and summarizes any other errors for the student at the end of the interview.

Interval Inversions:

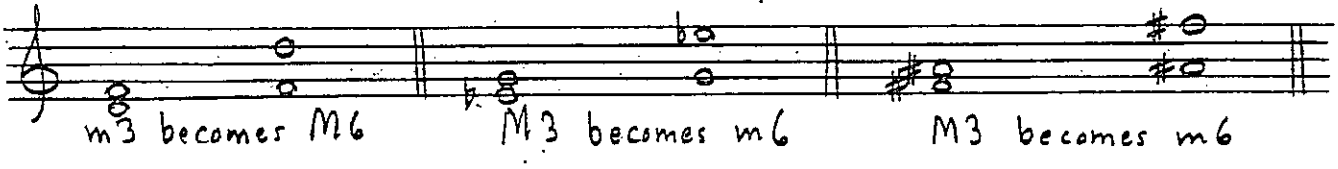
The study of interval inversions is important to clarify the framework of interval relationships, and because the inversion of an interval is very similar acoustically and musically to the interval inverted. The inversion of a series of harmonic intervals is frequently treated musically as if nearly identical to the original series, especially in contrapuntal music.

An interval is inverted by transposing one of the tones one octave in such a way as to cause the lower to become the upper:

is inverted by moving A up an octave: 

or C down an octave: ; the resulting interval has the C below A either way. C over A was a m3, and A over C is a M6 (play).

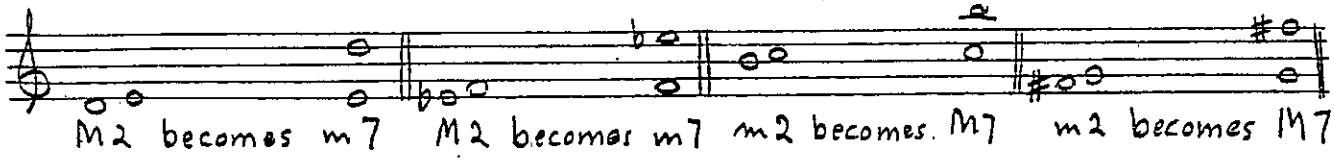
Suppose we invert a few other intervals, to see if we can detect any pattern:



M 3rds have consistently inverted to m 6ths, and m3rds have consistently inverted to M 6ths. This will always happen. Naturally, M 6 will invert to m 3, too, and m 6 to M 3, just applying the above in reverse.

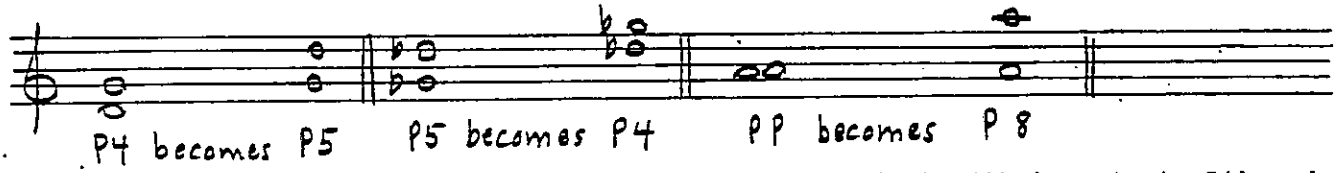
Notice that all minor intervals have inverted to major, and all major have inverted to minor. Also that all 3rds have inverted to 6ths, and all 6ths to 3rds.

Try some seconds:



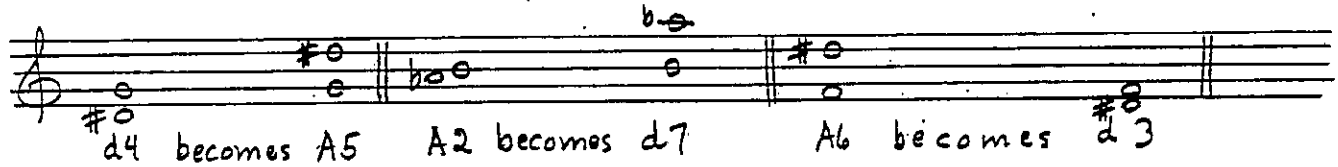
2nd becomes 7th, and vice versa, and the M-m exchange still operates.

Try some perfect intervals:



Each perfect interval inverts to another perfect; 4th inverts to 5th and vice versa. A prime has no upper or lower note whose order can be reversed. A prime inverted is considered to be an octave, and vice versa.

Try some augmented and diminished intervals:



Augmented becomes diminished, and vice versa. Ordinals invert as before.

To summarize all this, simply use these diagrams:

M ⟷ m	2 ⟷ 7	(Notice that the numbers of each
P ⟷ P	3 ⟷ 6	pair of ordinals always add up to 9)
A ⟷ d	4 ⟷ 5	
	1 ⟷ 8	

The augmented 4th and/or its inversion the diminished 5th are known as the tritone, so-called because it is made up of 3 whole steps.

Exercise IIIb (Independent Assignment 13 consists of study of the material on interval inversions and the following exercise.):

Write M, m, d, & A 2, 3, 6, & 7, and P, d, and A 4, 5, & 8 above and below E, leaving about ½-inch of space beside each interval. Label each. Then in the space, write the inversion of each interval. Label the inversions. Play, as

you write, any interval whose sound you cannot visualize reasonably quickly.

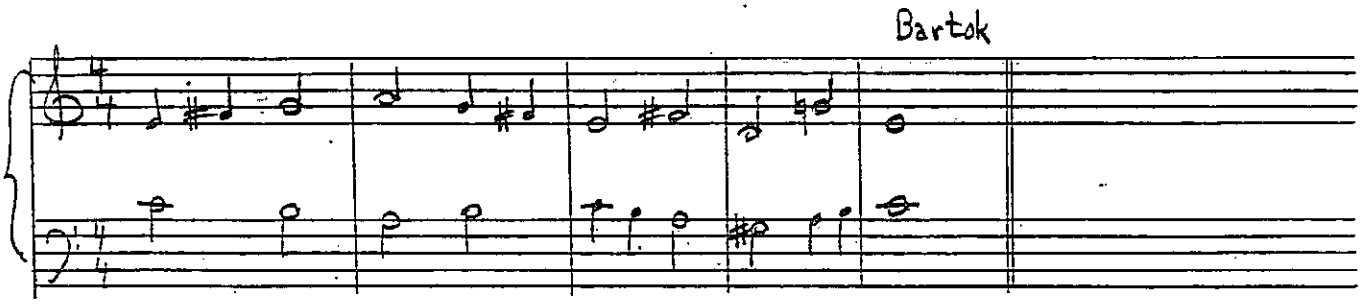
Exercise IIIc (Independent assignment No. 14):

Label the following 20 intervals correctly:

Exercise IIId (Independent assignment No. 15 and No. 16):

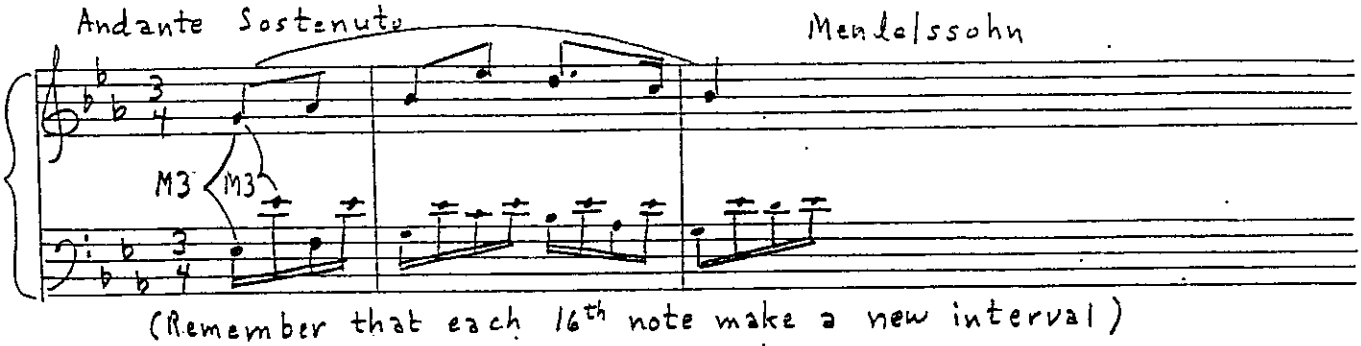
1. Analyze the melodic intervals in the following portions of a violin and piano sonata:

2. Analyze the harmonic intervals in the following excerpts. Be careful to notice all of the harmonic intervals, for example, when one voice moves and the other holds, which makes two successive harmonic intervals:



(assignment continued on next page)

When there are compound intervals (more than an octave) reduce to simple intervals, as indicated in the first case below:



(Remember that each 16th note make a new interval)

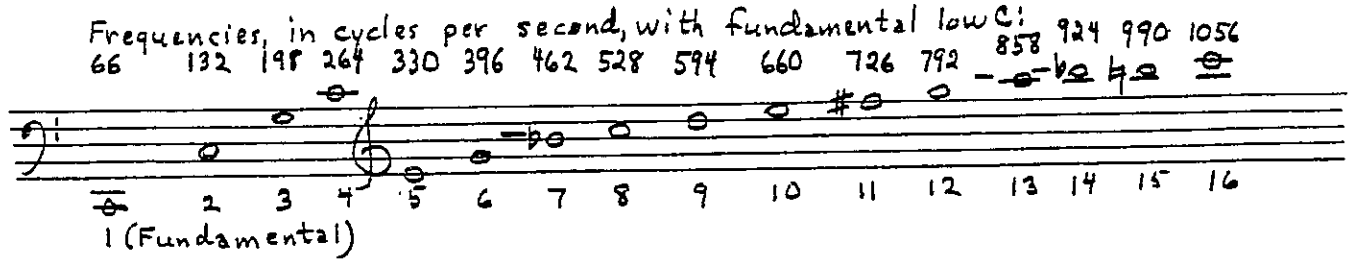
Acoustics:

Some fundamental notions of the nature of sound are important to any musician. Careful treatment of this subject properly belongs in a more complete course in Acoustics, but we will briefly consider some of these fundamentals necessary to the practical musician.

Sound is the result of a disturbance in air which is transmitted to the ear by wave motion of the air. If the sound is continuous (repetitious) it is termed a musical sound. The rapidity of the disturbance, called the frequency determines the pitch. The distinction between pitch and frequency is that the term pitch is applied to the effect of a given frequency on the listener. In most applications the terms may be interchanged. The loudness of a tone is the effect on the listener of varying intensity of the air disturbance, which is in turn dependent upon the amplitude of the disturbing (vibrating) vibrator (or generator). For instance, if a tuning fork, (a generator), is struck hard, the prongs vibrate widely (large amplitude), disturbing the air greatly (with great intensity) which make a great impression on the listener (is loud). If a tuning fork is so built as to vibrate fast, it disturbs the air rapidly (high frequency) producing a sensation of high pitch on the listener.

1. The Harmonic Series:

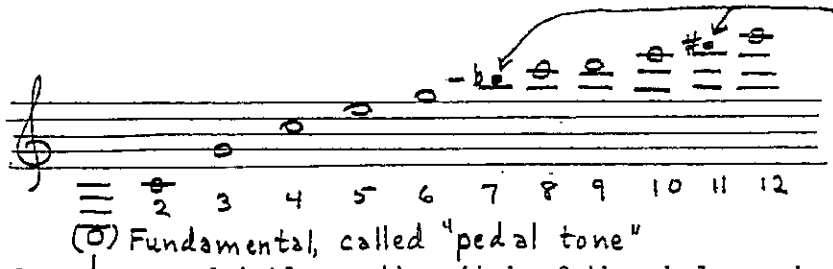
A pitch which is twice the frequency of a given pitch will be heard by the listener as the pitch one octave higher than that of the given. A pitch which is three times the frequency will be heard as a twelfth (an octave and a 5th) above the given, one which is 4 times as two octaves higher, and so on in a particular series of tones called the harmonic series. This series is so important to musicians and scientists and has so many applications that it is frequently referred to as the "chord of nature". Here are the first 16 tones of the harmonic series on low C. This pitch on which the series is built is called the fundamental.



The minus signs are meant to indicate the fact that a tone is a little flat compared with the tone usually expressed by that note in familiar scales. Sometimes there are no notes in familiar scales to accurately express these natural pitches.

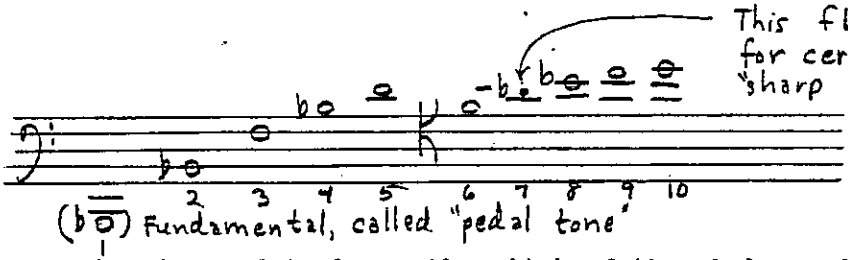
Students who play instruments will be interested in the avrious applications of this series to the different instruments, some of which are given below:

Trumpet's open tones (as written in his part):


Not used by trumpet players, because they are too flat. (The F# is not as flat as the Bb.)
1 2 3 4 5 6 7 8 9 10 11 12
(1) Fundamental, called "pedal tone"

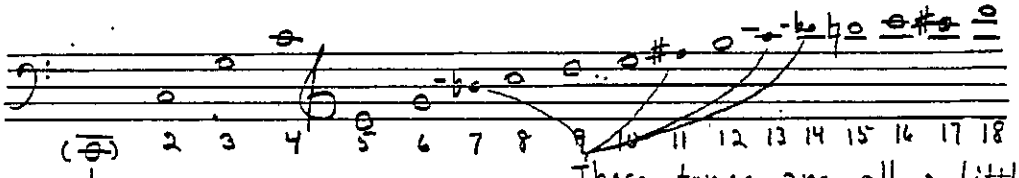
Valves are used to lower the pitch of the whole series to supply the other tones needed.

Trombone's open tones:


This flat tone is used for certain tones with "sharp 2nd" and "sharp 3rd" positions of the slide.
1 2 3 4 5 6 7 8 9 10
(1) Fundamental, called "pedal tone"

The slide is used to lower the pitch of the whole series to supply the other tones needed.

French Horn's open tones (as written in his part):


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
These tones are all a little flat. Before valves were invented, these tones were used, aided by the player's hand in the bell.

Violin G-string harmonics:

Harmonics are special tones produced by touching the finger lightly at certain points called "nodes". They can be produced on any string of any string instrument.

Higher harmonics are possible but increasingly difficult
1 2 3 4 5 6 7 8
Placing the finger over the notes in parentheses also produces the same harmonic, being the same fraction of string.

The correct placement of the node is always the fraction of the string's length corresponding to the number in the series. In other words, when one produces the 3rd harmonic, his finger is dividing the string into 3rds; when one produces the 4th harmonic, his finger is dividing the string into 4ths; etc.

The harmonic series is a beautifully symmetrical thing, and pointing out a few of these symmetries will help one both to appreciate it and to remember it. Refer to the illustration on page 13 (Syll. pg. 32).

First, notice that the numbers given below the notes indicate the number of times the frequency is a multiple of the fundamental (No. 1). These numbers are used to number the harmonics. (The term harmonic is accepted as meaning the fundamental and its multiples; the term overtone means the multiples only, excluding the fundamental.)

Second, notice some of the beautiful numerical interrelationships:

(a) Not only is the upper tone of the octave between nos. 1 & 2 twice the frequency of the lower, but the upper tone of any octave pair you can find on the series, like 2 & 4, 4 & 8, 3 & 6, 5 & 10, etc., is twice the frequency of the lower. This is an excellent aid to remembering the series. (Use the number in the series rather than the actual frequency to examine this. It's easier, and bears the same relationship.)

(b) Any pair of tones whose numbers have the same ratio as another pair will give the same interval. For instance, numbers 2 & 3 make the interval of a P 5, which is also made by 4 & 6, by 6 & 9, by 8 & 12, and by 10 & 15.

Third, notice that successive distances between members grow progressively smaller. This continues indefinitely, far beyond the 16 tones shown, until there is no significant difference between successive tones. All harmonics possible are not in the range of hearing of the human ear, however. The human ear normally hears as high as 15,000 cycles per second to 20,000 cycles per second, depending largely on the age of the individual.

2. Complex tones; tone quality:

A single vibrating medium (generator) not only vibrates simply, but manages to vibrate doubly, trebly, quadruply, etc., all at once. This is perhaps difficult to visualize. (With a little practice, one can make a child's skipping rope behave in a way illustrative of this: Tie one end, pull the rope fairly taut, get it to swinging up and down at the speed at which it will swing in its entire length. The try to move the hand twice as fast. As the rope tries to make the change, the convolutions it makes will be the result of vibrating both in its entire length and by halves, or singly and doubly at once. If one has access to an electronic instrument called a "strobo-lite" from a school physics laboratory or similar place, he can slow down visually the action of a string so that it can actually be seen.)

The particular amounts of the harmonics which thus vibrate with the fundamental determine the tone quality or timbre of the particular sound. Possibilities of varying tone qualities are infinite, but to cite a few examples, a string instrument has a fairly consistent amount of each harmonic, a clarinet has every other harmonic practically absent, and an oboe has so little fundamental that if it were not for the other harmonics you probably wouldn't even hear it.

Resonance is the transmission through the air of vibrations from one vibrating medium to another. This effect has sometimes been called "sympathetic vibration". It takes place when two media are capable of vibrations of the same frequency.

3. Interference:

A third important concept is the effect of hearing two or more sounds at once, that is, two or more vibrating media generating sound of different frequencies. This phenomen, called interference, or sum and difference tones, is important to a better understanding of consonance and dissonance, and has many other applications.

When two vibrating media are generating tones of different frequencies, besides the two, the ear hears a third tone which is the numerical difference in frequency between the two. If in its audible range, the ear will also hear a summation tone which is the sum of the two frequencies. You have heard difference tones in an out-of-tune piano, when two strings are not quite in tune, and seem to pulsate, or beat. The beat you hear is a slow difference tone.

Combining this phenomen with that discussed in part 2. above, we will also hear the sums and differences of every combination of every harmonic of each of the two tones, the sums and differences of the sums of the sums, of the differences of the differences, of the differences between the sums, etc., etc. This is a very complicated situation, but the ear interprets it very simply. Two tones whose fundamentals could be placed near the lower end of a series will generate tones which correspond with and reinforce tones of the series. For example, C & G, 132 & 198 cycles per second respectively, will generate sum tones (330 c.p.s.) and difference tones(66 c.p.s.) which correspond with and reinforce nos. 1 & 5 of the C series illustrated on page 13 (Syll pg. 32), whose fundamental is 66 c.p.s. Moreover, their harmonics will participate (Twice C, 264, plus G, 198, equals 462, #7 in the series; twice C,264, minus G, 198, equals 66, #1 in the series; twice G, 396, plus C, 264, equals 660, #10 in the series, etc.) There are many of these combinations, but all tend to further reinforce harmonics of C. Such tendencies are interpreted by the ear as consonance. A simpler way of summarizing this is to note that the more consonant intervals have lower numbers expressing their vibration ratios.

It would appear that labelling dissonance and consonance would simply be a matter of mathematics, but several factors preclude this, as they do any attempt to reduce art to scientific principles.[1] In the first place, the norm or threshold of distinction on the scale of consonance to dissonance varies according to time, place and persons, for example,what was once considered unpleasant is today regarded as pleasant . In the second place the ear has a way of interpreting intervals which are close to a consonant one but not exact as that consonant one in a slightly imperfect and cloudy form. (Ultimately, this is a fortunate thing.) In the third place, artistic principles are made by artistic choice, and sometimes deny what would seem to be natural expectation.) A more consonant interval as measured by the scientist might be heard by the musician as more dissonant. For instance, the perfect fourth is very consonant according to its ratio of vibrations, but it has usually been interpreted by musicians as a dissonance, because it moves so well

1 See Lloyd, Ll. S., "Theory, Scientific and Pseudo-Scientific" in Grove's Dictionary, 1955 edition.

to the major 3rd, which is interpreted as a reposeful consonance.

Temperament is the compromise in tuning necessary in our system of music. Mathematical relationships used in music are not all entirely compatible with one another. For logical reasons too extended to discuss here,[1] if the tones of the key of C were all tuned to give pure intervals in C, those tones would become progressively out of tune as they were used in keys with more sharps and flats in the signature. Moreover, as one moves around a circle of fifths, if the fifths are really perfect, B# will not quite equal C (B# would be 259.502 cycles per second, and C would be 256, using International Pitch). The error between the two is called the comma.[2] The present-day practice is to "share the error" equally, and the resulting scale is called "equally tempered", "well-tempered", or just "tempered". Octaves are pure, but all other intervals are slightly out of tune. For instance, all perfect fourths are slightly wide and all perfect fifths are slightly narrow in the well-tempered scale, in order that all perfect fourths or all perfect fifths on the keyboard may be equally out of tune. The difference is slight enough that unless this has been pointed out before, you were probably not aware of it.

(Independent assignment No. 17 is to the material on Acoustics to this point)

Assignment IIIe (Independent assignment No. 18):

Answer the following multiple choice questions about Acoustics. You may re-read the study material to find the answers, if necessary. Check yourself by the answers printed upside down at the end of the test. Make sure that you understand thoroughly any misconceptions revealed:

1. The distinction between pitch and frequency is:

   (a) Pitch is higher than frequency.
   (b) Pitch is the effect on a person; frequency is independent of persons.
   (c) Frequency is how often the note is repeated; pitch is how high or low it is.
   (d) Frequency is the result of pitch operating on a person.

2. Intensity:

   (a) Determines the loudness.
   (b) Enriches the tone quality.
   (c) Determines the pitch.
   (d) Increases in a diminuendo.

3. Increasing amplitude of vibration:

   (a) Increases intensity but not loudness.
   (b) Increases loudness but not intensity.
   (c) Decreases both loudness and intensity.
   (d) Increases both loudness and intensity.

1 Harvard Dictionary, page 734.
2 Harvard Dictionary, page 166.

4. The term "harmonic":

   (a) Is a synonym for "overtone".
   (b) Refers to all members of the harmonic series but the fundamental.
   (c) Includes the fundamental.
   (d) Means a tone generated by sympathetic vibration.

5. In the harmonic series:

   (a) A pitch with 3 times the frequency of a given tone will be heard as an octave of it.
   (b) No. 2 is an octave higher than No. 4.
   (c) Any adjacent pair of tones on the series will be an octave apart.
   (d) (None of the choices (a), (b), & (c) are correct.)

6. Sum and difference frequencies:

   (a) Can be heard with any single tone.
   (b) Are synonymous with "resonance".
   (c) Result when the ear hears two or more vibrating media at once.
   (d) Can be made to cancel each other out by increasing the intensity.

7. Consonance and dissonance:

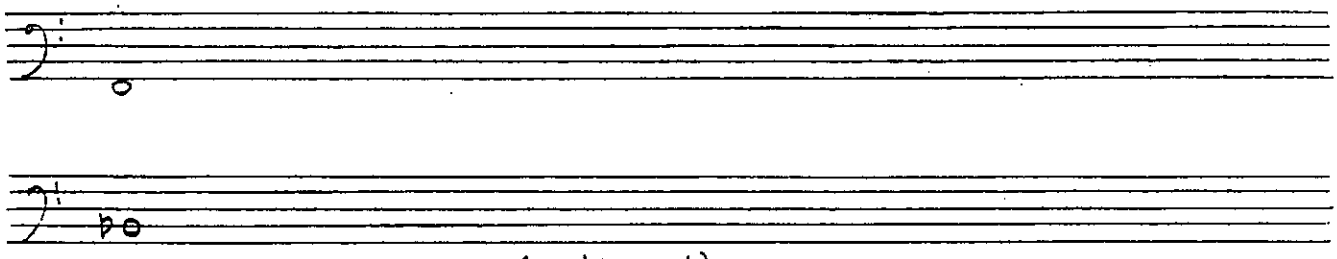
   (a) Have an unvarying norm from age to age.
   (b) To musicians, depend only on vibration ratios.
   (c) Are the interpretations people make in perceiving harmonic intervals.
   (d) (None of the choices (a), (b), & (c) are correct.)

Answers: 1:b; 2:a; 3:d; 4:c; 5:d; 6:c; 7:c.

Exercise IIIf (Independent assignment No. 19):

Memorize the pattern of the harmonic series, by respective intervals, by the symmetrical ratio relationships, and by any other means you find helpful.

Write harmonic series with the following tones respectively as fundamental. Number the harmonics in the usual way:



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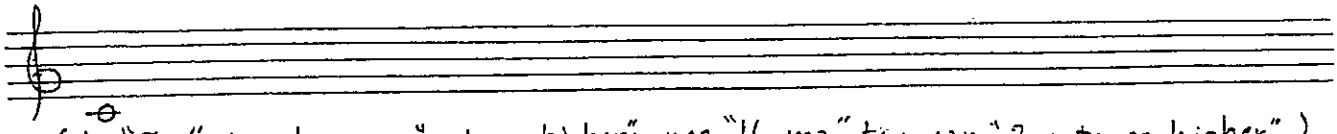
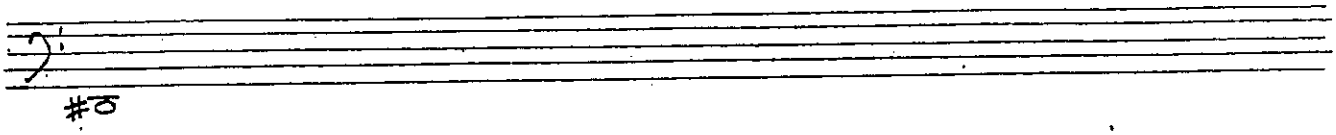
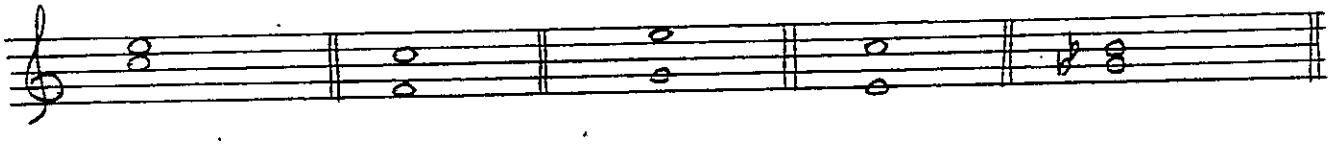


(Use "8va" sign to mean "octave higher"; use "16 ma" to mean "2 octaves higher".)



Find the pitches of the sum tone and the difference tone of each of the following pairs. Do this by finding by trial and error a harmonic series to which both belong, then writing the note represented by their difference and the note represented by their sum. For example, in the first case below, the notes are both in the harmonic series of the C below middle C, being nos. 4 & 5. The difference between 4 & 5 is 1, so their difference tone is no. 1, the fundamental, C below middle C. The sum of 4 & 5 is 9, and the 9th tone of that series is D above the treble staff:



Topic IV: Time, Rhythm and Meter

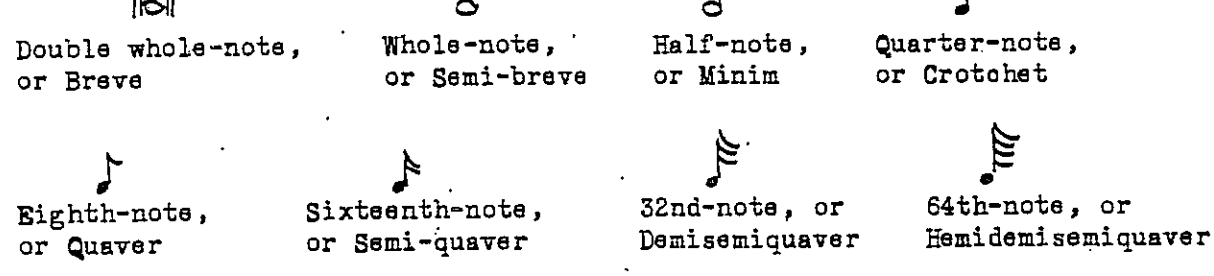
A very basic distinguishing characteristic of music as an art is its dependence on unfolding through the passage of time. Naturally, then, the rhythmic aspect of music is essential. One can conceive of music without melody, or without harmony, but not without time or pulse values of some kind.

The three terms time, rhythm, and meter are used loosely and more or less interchangeably. When used more specifically, meter refers to the regularity of recurring pulse and accent background. According to Apel in the Harvard Dictionary,[1] rhythm is the all-inclusive term including "everything pertaining to the temporal quality (duration) of the musical sound".

From about 1600 A. D. to the present day most music has been metric, meaning that it has a regularly recurring stress or pulse. This is called "classical" rhythm.[2]

Meters are indicated in a time signature, a numerical fraction at the beginning of a composition which gives information about the meter. Each metric group is called a measure and is separated from other measures by a bar-line. The first beat in each measure is understood to be accented. It is most important that students "feel" rhythmic patterns, rather than simply be satisfied that each measure contains enough total rhythmic values. Rhythmic "feel" was a human experience long before notes values existed.

In America, rhythmic note values are given a fractional name. Here each one is pictured with its fractional name, and also its equivalent English name:



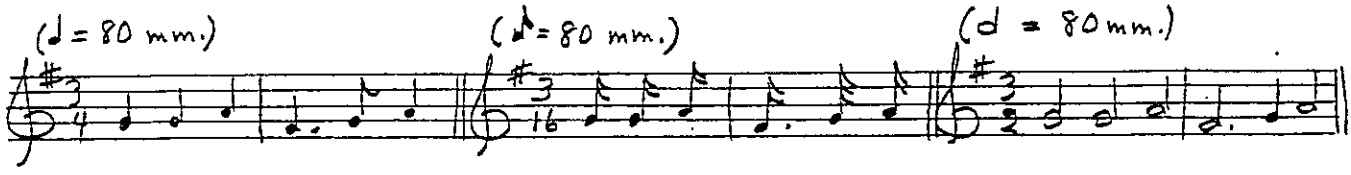
Double whole-note, or Breve	Whole-note, or Semi-breve	Half-note, or Minim	Quarter-note, or Crotchet
Eighth-note, or Quaver	Sixteenth-note, or Semi-quaver	32nd-note, or Demisemiquaver	64th-note, or Hemidemisemiquaver

Relative values of notes are consistent with their fractional names. That is, a whole note is twice the value of a half-note, four times a quarter, etc.

Simple meters are the commonest. In simple meters the beats divide into portions which are powers of the fraction $\frac{1}{2}$, that is, $\frac{1}{2}$, $\frac{1}{4}$, 1/8, 1/16, 1/32, etc., and combinations thereof. The way in which main beats are divided in a piece of music is called the background of the beat. Simple meters use a time signature whose upper number indicates the number of beats in each measure and whose lower number indicates the value of note which gets each beat. For example, 3/4 indicates that there are 3 (upper number) quarter-note (lower number) beats per measure, 4/2 indicates that there are four half-note beats per measure, etc. This is essentially the same as a numerical fraction. If you will recite the time signature like a fraction you will automatically recite the contents of one measure, for example, in 3/4, "three-quarter", in 4/2, "four-half", in 2/8, "two-eighth".

1 Harvard Dictionary, page 639
2 Harvard Dictionary, page 641

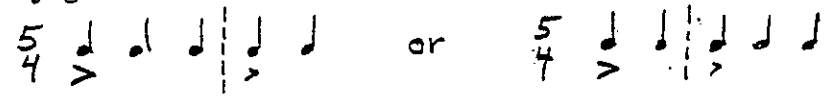
The quarter-note beat is no more "normal" than any other. There is no implication of speed when using 8th notes or smaller values, or of slowness when using halves or larger values as beat-notes. For example, all the following sound identical to each other in every respect:



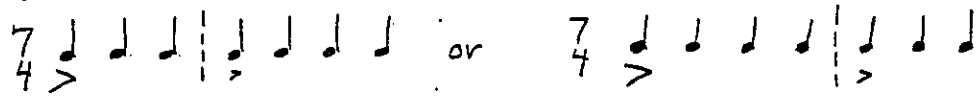
Meters with two beats per measure are called duple or double; those with three beats per measure are called triple; those with four, quadruple; those with five, quintuple; and those with seven, septuple. (Those with six are compound, as we will see.)

Quadruple meters are really duple duple, being duple meter doubled up. They have a main accent on the first beat and a lighter accent on the third beat:

Quintuple meters are a combination of triple and duple. Either the triple or the duple may get the main accent:



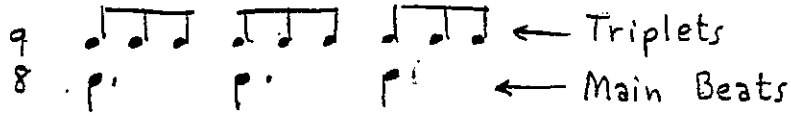
Septuple meters are a combination of quadruple and triple:



The dotted lines are frequently used in quintuple and septuple meters to aid the eye in the division. These meters are considered simple meters, even though they seem rather complicated.

Compound meters in music are those with triplet background, in other words, a background of thirds of a beat. In musical rhythm, the word "compound" is used only in this way.

Time signatures of compound meters do not show directly the number of beats per measure. Instead, they show the number and note value of the triplets. For example, in 9/8 time (recite it "nine-eighth"), there are 9 8th-note triplets, and we have to discover from that that there are 3 main beats:



Time signatures having an upper number 6, 9, 12, 15, etc., that is, any multiple of 3 not including 3 itself always indicate compound meters.

When you examine a given time signature to discover whether it is simple or compound, how many main beats it indicates, and the value of the main beat:

1. See if the upper number is 6, 9, 12, or 15. If it is one of these, the meter is compound. If not, it is simple.

2. If compound, the time signature is indicating the number and value of the triplet, not the main beat. To discover the number and value of the main beats, simply group mentally the triplets into sets of 3. The number of sets will be the number of main beats, and the equivalent value of one set is the value of the main beat note. For example, in 12/4 (recite it "twelve-quarter"), the upper number 12 shows that the meter is compound. The lower 4 refers to the note value of the triplet, indicating that there are 12 quarter-note triplets:

This is 4 sets of triplets, and the equivalent value of one set (3 quarters), that is, one main beat, is the dotted half. (In modern times, the dot placed after a note increases its value by half of itself.):

3. If simple, the upper number tells directly the number of main beats and the lower tells the value. For example, in 4/2 time, "four-half" time, there are 4 half-notes per measure.

Exercise IVa (Independent assignment No. 20 includes the above study material on Rhythm and this exercise.):

State whether the following are simple or compound, the number of main beats per measure, and the value of each main beat:

6	3	12	9	4	2
8	4	16	4	1	2

Certain signs, inherited from the mensural notation and proportional notation systems of the 15th & 16th centuries, are now equivalent to certain fractional time signatures:[1]

$C = \frac{4}{4}$, and ¢ = "alla breve", which in classical and modern rhythm means "by the half-note" (even though a breve is not a half-note). Usually ¢ means $\frac{2}{2}$, but it can mean $\frac{3}{2}$ or $\frac{4}{2}$ nowadays.

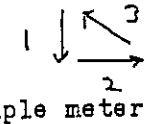
Students should know the usual conductor's beat patterns. To be felt genuinely, rhythms must be felt through a body motion. The usual patterns are simple and logical, and students should make these motions when attempting to feel rhythm.

All beat patterns have one thing in common. They use a down-beat, a downward arm motion, for any 1st beat of a measure, and an up-beat for the beat immediately preceding a down-beat, in other words, the last beat of a measure. The other beats needed move in some way other than up or down. Details follow:

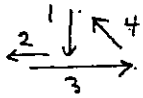
1 Harvard Dictionary, pages 439 & 607.

Duple (two-beat) meter is simply a down-beat followed by an up-beat. When beating any beat pattern make it as graceful as possible, and have a "point" to each beat, a destination toward which the arm moves with a slight sense of "snap":

Triple meter is down, right, up:

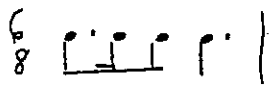


Quadruple meter is down, left, right, up:

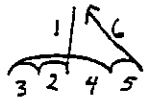


These 3 patterns take care of nearly all situations. If the meter is quintuple or septuple, the proper combination of 2- and 3- beat or 3- and 4- beat patterns is used. Compound meters are beat according to the main beats, which are duple, triple, quadruple, etc.

6/8 is basically a compound duple meter, but it is sometimes taken "in six", with "divided" beats, little extra beats for the triplet divisions, for example in the carol "Silent Night":



Six-beat pattern:

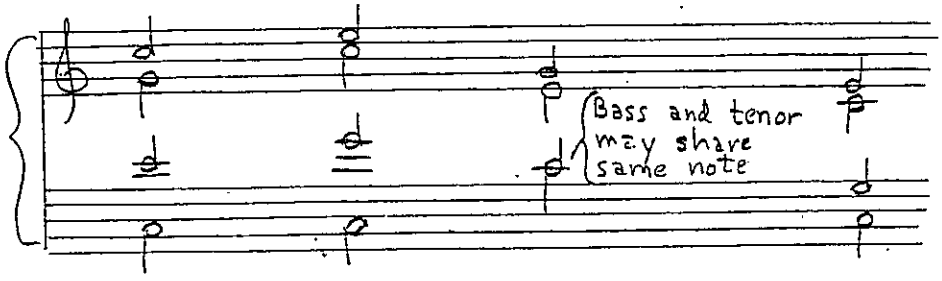


Exercise IVb (Independent assignment No. 21 is to study the above material and do this exercise.):

Do either No. 1 or No. 2 below:

1. Find from musical literature (music for your own instrument, ensemble, songbook, etc.) examples of typical rhythms in simple duple, simple triple, and simple quadruple meters, using any beat note except a quarter, and of compound duple, compound triple, and compound quadruple, using any beat-note. Copy about four measures of each of these examples (one melodic line only). Recite to yourself with the conductor's beats and some neutral syllable like "loo" each of these patterns.

2. Make up four measures each of typical varied rhythms in simple duple, simple triple, simple quadruple, compound duple, compound triple, and compound quadruple meters. Do not start this by putting values on paper, simply adding notes until each measure is quantitatively complete. Rather, try to get in the "swing" of the meter by using the conductor's beat, then think the appropriate division of each beat, then improvise a reasonable rhythm, then write the one you have improvised. You will be expected to be able to recite any rhythm you write in this assignment. Remember that the natural unit of a compound meter is a dotted note.



All correct (play)

Open position means that there is room for one chord tone (only) between each adjacent pair of the upper three voices, that is, between soprano and alto, and between alto and tenor. The bass again may be any distance from the tenor. It may even share the same pitch. Notice that open position does not include all possible distributions that are not close. It is a specific arrangement:

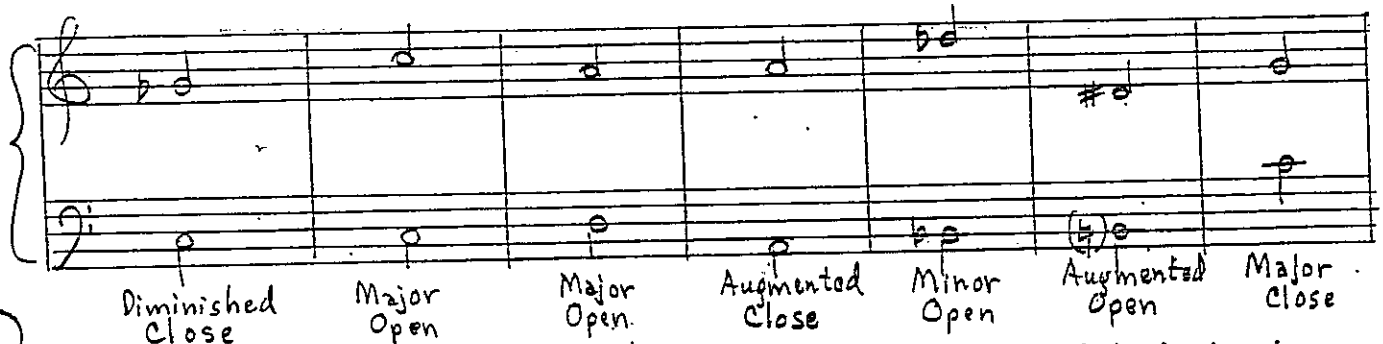
All correct (play)

In most part-writing, the root of a triad is best to double, but for the present and until further notice, we will always double the root.

To build a given triad in open or close position, first write the root in the bass, then choose a soprano note, either root, 3rd or 5th. Work down from the soprano to the alto and then to the tenor, spacing them as is required for whichever is specified, open or close. The distance left over, between the bass and tenor, may be any distance. However, the tenor must not be lower than the bass.

Exercise Vb (Independent assignment 23 is to study the above material and do this exercise.):

In the examples below, fill in alto and tenor voices to complete triads in the position, open or close, and the quality (M, m, d, or A) requested:



Then write M, m, d, and A triads on the roots D and E-flat, in 4 voices, doing each in open, then each in close position. Use your choice of chord member in the soprano, but vary your choices so that root, 3rd, & 5th are about equally represented.

Exercise Vc, Keyboard (Independent assignment 24):

Practice playing at the keyboard various root position M, m, d, & A with random choices of root tone, and with random choices of root, 3rd or 5th for soprano note. Pose the problem in advance, for example, "Play on root A a minor triad with the 3rd in the soprano, open position", then work it out. Don't think too much about correct fingering, and let your left hand jump quickly (arpeggiate) from bass to tenor if the span between bass and tenor is too large to play both notes at once. If more convenient, play 3 tones with your right hand and only one with your left.

Demonstrate for your instructor your ability to do this by playing 5 or 6 examples which he will call for at random.

Ear Activities:

Triad qualities:

As indicated in our first consideration of Ear Activities, in Topic III, exercise in hearing major, minor, diminished, and augmented triad qualities, should now be begun. The goal is the ability to identify 90% of major or minor triads heard, and 75% of diminished and augmented triads heard, all played in root position.

Usually students learn rather easily to identify the major triads, and with a reasonable amount of drill can learn to identify minor triads. But most students encounter some difficulty in learning to distinguish diminished triads from augmented.

Begin by playing successively major, minor, diminished and augmented triads in similar distribution, so that students can hear them compared. Then, play a few major and minor triads only, in random voice distributions (always with root in the bass, however), asking students to distinguish between them. Then add diminished triads, so that there are just 3 choices.

Next, practice distinguishing diminished from augmented. Special help is needed for these. Here are some distinctions:

(1) There are minor 3rds to be heard in the diminished triad, but no major 3rd. There are major 3rds to be heard in the augmented triad, but no minor.

(2) The diminished always has a tritone in it. The augmented triad never has a tritone.

(3) The augmented triad sounds as if its members are selected from the whole-tone scale. The diminished triad does not.

Play random samples of M, m, d, & A triads.

Advise students to listen for the bass tone, then to mentally sing across the triad, measuring the intervals carefully. Individuals must find their own way

to best details of method, however.

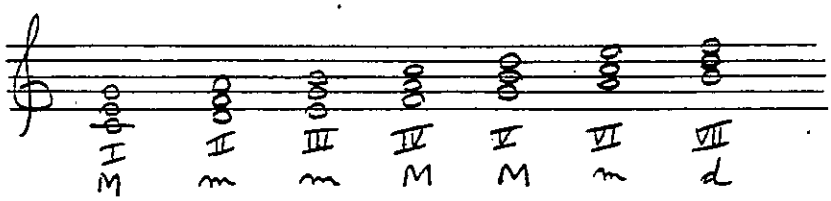
Continue drill from time to time until each individual reaches the qualifying goal, 90% of M & m triads, 75% of diminished and augmented. The author uses 20 - item tests, 12 items of which are d or A, and 8 of which are M or m. The tests are designed so that about an equal number of items have respectively root, 3rd or 5th in the soprano, that about an equal number are each open or close position, and that the roots are chosen at random. Students who get at least 9 of the 12 d or A, and at least 7 of the 8 M & m are considered qualified. However, it is necessary to review from time to time after qualifying, to prevent the fading of this ability.

Rotate interval drill, melodic dictation and triad qualities, so that none of the skills deteriorate. There is a considerable amount of mutual benefit in the various ear activities. They aid each other. For example:

The new knowledge of open position triads offers a good aid for distinguishing between intervals of a major or minor 6th played harmonically, an interval which is quite troublesome. A major sixth sounds like the soprano and alto of an open position major triad with 3rd in the soprano, and a minor sixth sounds like the soprano and alto of an open position major triad with root in the soprano, or, simplifying, the minor 6th sounds like root in the soprano, and major 6th doesn't.

Topic VI: Principal Triads in Major Keys; Tonality

When we consider triads in a given major key, we may build triads on each successive tone of the scale, and we will find that each triad thus built has its own relationship to the key center. Each will also be a M, m, or d triad. For example, in C Major:



Some of these chords have more character, more key value, than others. It is sufficient for this stage to become aware of some of these fundamental differences, to begin to learn to distinguish them by ear and to deal with some fundamental matters about them.

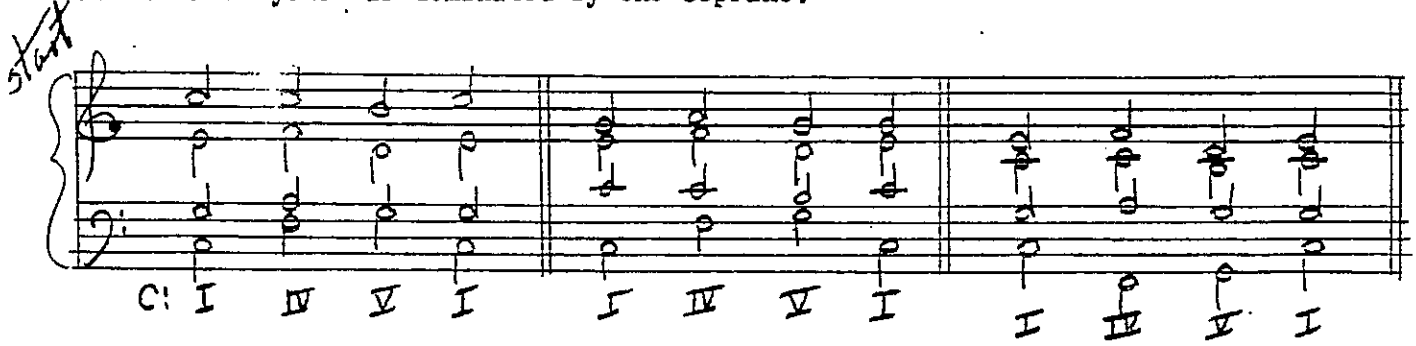
But first notice the Roman numerals placed under each of the triads in the example above. It is conventional to abbreviate triad fundtions in a key in that way. I (pronounced "one", not "first") being synonymous with "tonic", II with supertonic, III with mediant, IV with subdominant, V with dominant, VI with submediant, and VII with leading tone. Roman numerals are used for this purpose in music theory.

Three of the above harmonies are very significant to a key, enough to be called "Principal". They are I, the Tonic (the home chord); V, the Dominant (the home-pointing chord, after which we want to hear the tonic); and IV, the Subdominant (a related harmony, with some tendency to point to the dominant, but able to progress quite naturally also to the tonic). The Subdominant is the tone to which the tonic is in dominant relationship, sort of "reverse dominant" or "inverted dominant". Common-practice pieces of music depend essentially on the functions represented by these three harmonies. Many simple tunes, such as folk tunes and hymns, don't use any other harmonies. In fact, many of these simple tunes use only tonic and dominant harmonies.

We will delay further consideration of II III, VI and VII chords for some time, to encourage thorough familiarity with the more fundamental I, IV & V.

To exhibit their particular function in a key, any one of these chords must be heard in company with other chords in the same key. A given triad like C, E, G could be a I in C, a IV in G, or a V in F, and the ear couldn't tell which it is without hearing other chords in the key.

Let us hear some groups of principal triads in a key, represented by the very common formula , I, IV, V, I. Try to listen to a chord's total character in relation to the other chords. Try to listen to a chord from the bottom up, so as not to have your ear dominated by the soprano:



We hope you can hear the strong sense of finality, of repose in the arrival of the final I chord, and can hear also the "home-pointing" quality of the V, which seems to ask for I. The IV sounds as if it belongs, but possesses neither the quality of the I or of the V.

Perhaps hearing these same chords in defferent sequence will help to make these functions clearer:

sounds incomplete, as if there's more to come. The final I is needed. This illustrates the "home-pointing" quality of the V and the finality or "at home" quality of the I.

sounds as if it "got lost". Besices not having the I after the V, the IV followed the V, which tends to sound regressive, as if it were going backward.

The formula I, IV, V, I represents a musical composition in miniature, a complete musical unit.

A cadence is a closing, or ending. Cadences are named after their penultimate (next to last) and ultimate (last) chords. They are called authentic if the penultimate chord is V and the ultimate is I; they are called plagal if the last two chords are IV, I. (This use of the terms authentic and plagal has no connection with their use in modes.)

Ending a phrase on the dominant (V), gives the phrase an unsettled, suspended, questioning quality. This is commonly used at the end of a first phrase in a musical sentence of two phrases. Such an ending is called a half-cadence. Some authors call any cadence which is satisfactory as a close a perfect cadence. That usually means having the tonic tone in the soprano on the last chord. We can therefore have either perfect authentic or perfect plagal cadences.

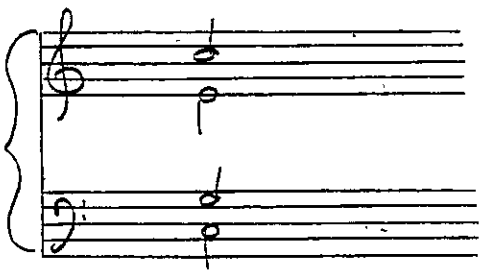
Exercise VIa (~~Independent assignment No. 25 is to study the above material and do this exercise~~):

On a separate sheet of staff paper, write a I in close position, a I in open position,a IV in close position, a IV in open, a V in close and a V in open, respectively in the keys of C, B-flat, A and B.

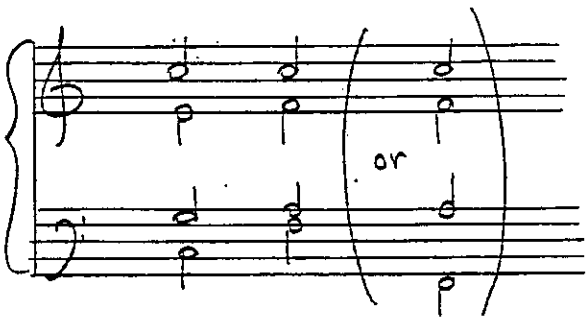
Chord Connections:

Music of the common-practice period is an inseparable combination of harmonic (vertical) and melodic (horizontal) factors. Even at this most primitive stage we can't consider one without the other.

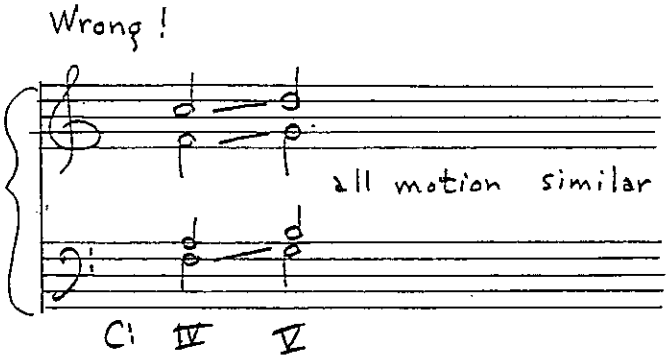
Regarding the melodic aspect, the smoothest action for a melody to take is to repeat the same tone, the next smoothest to move a degree up or down. Each leap larger is proportionately less smooth. When comparing relative motion between two melodies (voices), we say they are similar if they both move up or both down; we say they are contrary if they move in opposite directions; we say they are oblique if one holds still (repeats its tone) while the other moves in either direction. Between the possible different pairings of four voices, there is just one situation consistently to be avoided, that when all four voices move in similar motion, all up or all down. A given voice also should avoid a dissonant leap, like a seventh or a diminished 5th. Let us examine some of the considerations in writing a smooth and unified I, IV, V, I succession. Look first at just the connection I, IV. Assume we are beginning with the following distribution of the I:



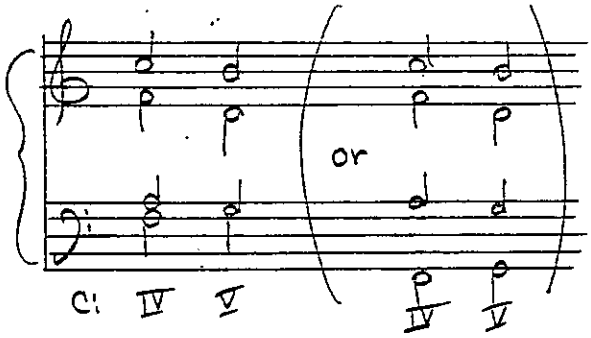
Since all of our triads are to be in root position, the first move is to write the root of the IV, which is spelled F A C, in the bass voice. Either the F above or the F below the first C will do. Looking at the remaining voices of the IV, the smoothest connection for all voices concerned which will result in an open or a close position (the most desirable distributions) will be to keep the C, a member of both chords, in the soprano voice and to move the remaining voices each up one degree, the alto E to F, the tenor G to A:



To move from this IV to the next V, first write the bass, G. (Use the 4th space G, right next door.) Turning to the other tones, we find that there is no common member between these two chords (spelled F A C and G B D). We can't move every voice up one degree, because then all voices would be moving in the same direction (all similar motion). There is an additional objection to this, called parallelism, which will be explained later:

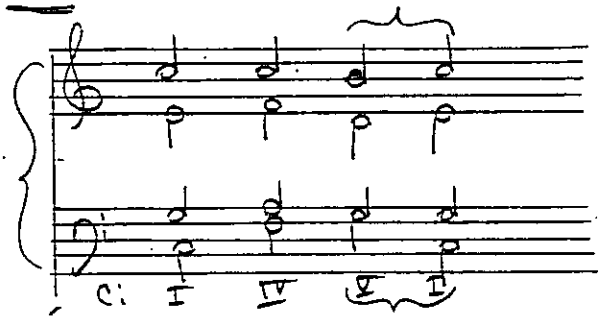


To get some contrary motion and keep the chord in either open or close position, we will move each of the upper 3 voices down to its next nearest chord tone:



This meets the objection of the similar motion and is still very smooth.

To move from V to I, write the bass of I first. Look for a common tone (member) in the chords (G B D and C E G). There is one, G. Keep it in the voice now sounding it, the tenor. Move the remaining two voices the nearest distance for both taken totally which will complete the chord. That would mean to move them both stepwise upward:



Notice that the last chord is identical with the first. The upper 3 voices of such a formula as I,IV, V, I will always be thus identical if the rules of motion are correctly followed. The bass may be an octave away from its original.

Here codified are the strict chord connection rules we just used:

1. Write the bass, allowing no dissonant leap (as we would have had if we had used the 4th line F and the low 1st line G).

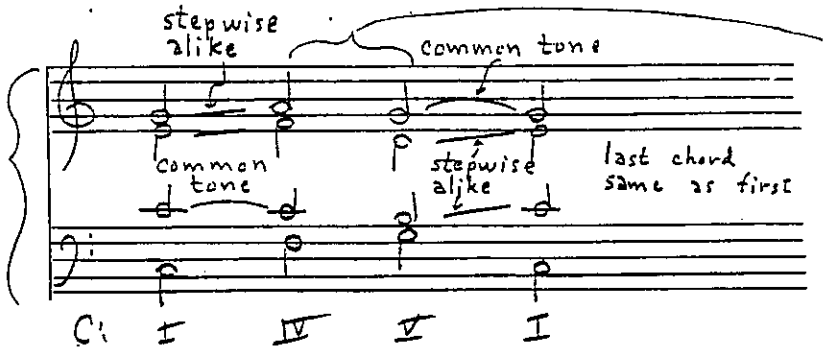
2. Keep the common tone (member) in the same voice.

3. Move the remaining voices stepwise in the same direction either up or down as necessary to complete the chord.

If there is no common tone, substitute the following for steps 2 and 3:

Move the upper 3 voices contrary to the bass, each to the next nearest chord tone.

Here are two other examples of I IV V I with strict chord connections for your examination:



no common tone, so upper 3 voices go to nearest chord tone in contrary motion to bass

Do not try to find another way to proceed when writing strict chord connections. You have been encouraged to discover your own best individual approaches to ear training, but this is a different matter. The author has never encountered a case in which a student was able to find an easier way than the one given.

Exercise VIb (~~Independent assignment 26 is to study the above material and do this exercise.~~):

On a separate sheet of staff paper, work out the formula I, IV, V, I, beginning once in open position, and again in close position, in each of the keys of C, D, E-flat and E. Vary the choice of root, 3rd, or 5th for the first soprano note, so that every possibility is used. You will have eight formulas.

Exercise VIc, Keyboard (~~Independent assignment 27~~):

At the keyboard, play the formula I, IV, V, I in strict chord connection in the key of B-flat, beginning once in open position, and again in close position. Place the 5th in the soprano in one example, and the 3rd in the soprano in the other. It is important to think directly onto the keyboard. Do not write the notes out first, then read them. Follow this procedure:

Choose your first chord distribution, then think through the chord spelling of the next chord without taking your fingers off the chord just played, then apply the strict chord connection rules: (1) play the bass; (2) keep the common tone; (3) move the remaining two voices stepwise to complete the chord; if no common tone, move upper 3 voices contrary to bass to nearest chord tones of the new

chord. Repeat these steps to move to the next chord, etc.

Practice until you can play these for your instructor without hesitation or error in very slow tempo. You should be able to accomplish this simple activity even if you have never studied piano before. However, ask for special help if you do not seem to be making progress after 20 or 30 minutes of serious effort. A little help at this point goes a long way, and it is important that you do not become discouraged.

Ear Activities:

Principal Triad Functions:

Principal Triad Function Dictation, the identification of I, IV, & V chords in a given key, may be begun at any time from now on, when students have sufficient grasp of previous ear activities that they won't be confused by another new one.

Choose a key, and play a I, IV, V, I succession according to strict chord connection rules, in either open or close position with root, 3rd, or 5th in the soprano.

As the I is played, call attention to its restful, final, key center feeling. Call it the "home" chord. Call attention to the home-pointing quality of the V, its tendency to pull to I. Call attention to the character of the IV, which is clearly related to the V & I, with some pull from IV to V, but not as strong as that from V to I. Also call attention to the regressive sound of V followed by IV, but mention that this is not wrong, just regressive. Also call attention to the IV, I relation, called "plagal" or "Amen".

Replay I, IV, V, I in other distributions (always with root in bass, of course), emphasizing that each group should sound more like other I, IV, V, I groups than different from them. If it sounds more different than similar, the student is probably listening too much to the soprano. Encourage him to listen for the bass, and emphasize it a little at first. It is the harmonic character, the special place of the individual harmony with reference to the key center, that we are learning to recognize in this activity.

Continue to drill from time to time on this activity until each student can identify 90% of the triad functions played. The author plays 7-chord groups which use simple tunes in the soprano, each chord of which is a root position principal triad in either open or close position, in the manner taught in Topic VII, Harmonizing a Melody.

Continue to rotate ear training activities. Increased skills in each activity facilitate the other activities.

Topic VII: Harmonizing a Melody; Analysis

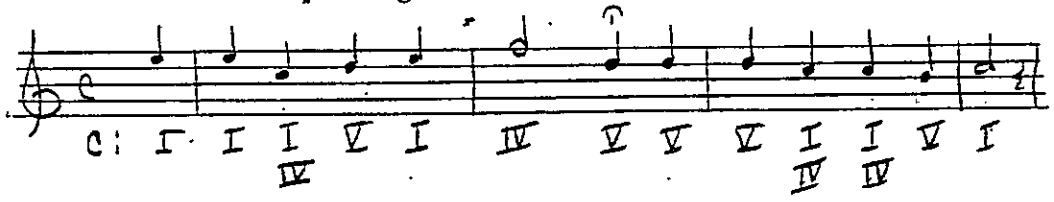
Harmonizing means writing other parts to a given melody. Harmonizing can be done quite satisfactorily using only root position principal triads, except that the bass line must be somewhat angular. For the present, the author believes it essential that we become skillful at the exclusive use of root position principal triads in either open or close position. Much music uses root position principal triads extensively, for example, much 16th century choral music.

When harmonizing, we must first discover what harmonies will suit a given tone in the melody. Suppose we are to harmonize the following melody portion:

Play or sing the melody through. This is very important because we must work with sound rather than by rules only.

Spell the principal triads in the key. Play some version of I, IV, V, I, to firmly establish the key and its principal harmonies in your ear, so that you can "hear" each harmony mentally as you work with it.

Plot the chord possibilities of each melody note so that the melody note be included in the chord spelling:



Part-writing Prohibitions:

In the last topic, when we used strict chord connection rules, we were being protected by those rules from certain kinds of motion which have been established by long practice of composers as being undesirable in ordinary part-writing. In harmonizing given melodies, we will have to face these hazards, since a given melody will not always lie in such a way that we can apply strict chord connection rules.

Here are the prohibitions:

1. Avoid having voices move in all similar motion.

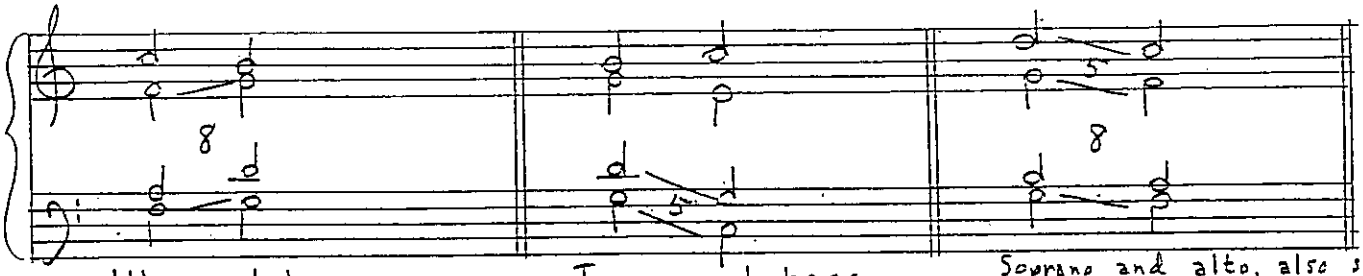
2. Avoid overlaps. Overlaps are situations where a given voice crosses over an adjacent position of a neighboring voice. For example:

Tenor overlaps alto, since it crosses higher (to E) than the previous alto note (D).

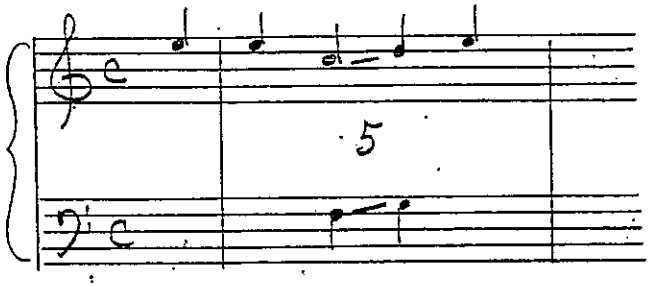
Bass overlaps tenor since it crosses below the succeeding tenor note.

3. Avoid dissonant leaps in a given voice. As explained previously, dissonances are 2nds, 7ths, and all diminished and all augmented intervals, and a leap is any distance wider than a whole step. For example, a bass moving from upper V to lower G would be moving a seventh, a dissonant leap.

4. Do not use parallel octaves or parallel fifths. Parallel octaves or fifths are situations where two independent voices move in similar motion a perfect octave or a perfect fifth apart (simple or compound). Examples:


Alto and bass move in parallel octaves
Tenor and bass move in parallel 5ths
Soprano and alto, also soprano and bass, move in par. 5ths
Alto and bass move in par. 5ves.

Turning back to the melody, as we saw when we plotted the chord possibilities, the first E's will need to be harmonized with I. Considering the 3rd note, C, suppose we were to use IV. We must have the root in the bass, F. Next, we must also have V to fit the melody note D, necessitating bass G. Therefore, we would have the following:

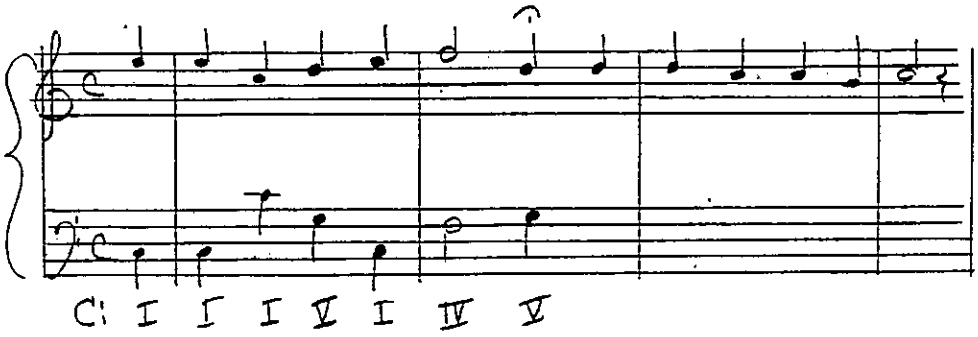


Therefore, we will choose I instead of IV for 3rd note C. In the next place offering a choice, 3rd measure, 2nd beat, if we choose IV, we will have parallel fifths for the reason just discussed, with the preceding V which has melody note D. So again it must be I.

The next beat, however, really allows a choice with no such difficulties. You may choose either. Try both at the keyboard and see which you like best by actual sound. Don't simply pick by chance.

Decide the remaining chord choices, using similar trial and reasoning. You will definitely want to end with I, in order to sound final.

Next, tentatively write the bass line for the first phrase, listening for nice musical balance of line between bass and soprano. The following version has contrary motion and each line sounds well (allowing some consideration for the necessary angularity of the bass line). Use this for the time being. You will be given opportunities to choose other possibilities in later cases:



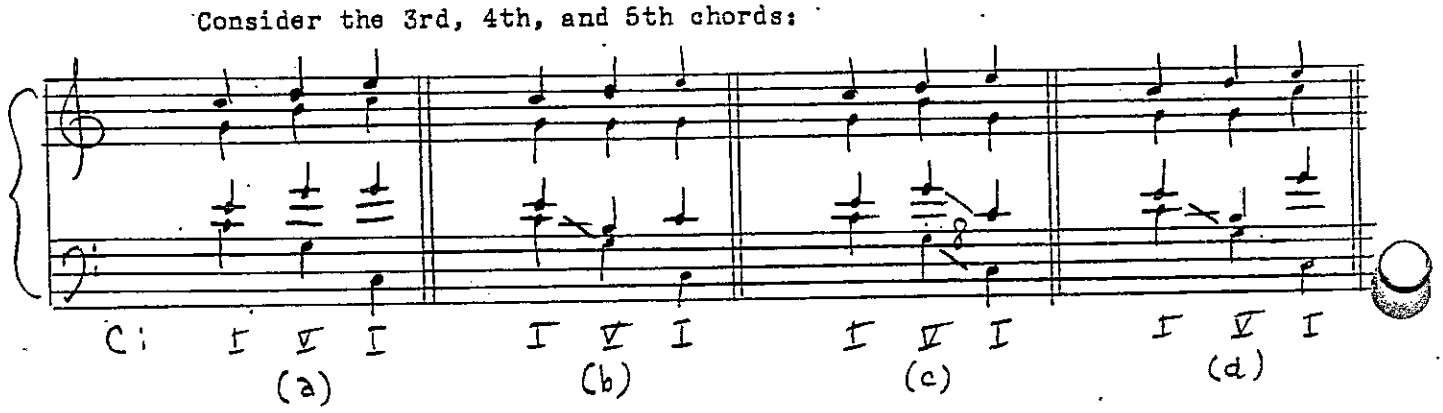
Sometimes you will need to go back and change a bass note or two after completing the parts because of difficulties which do not show up until parts are complete. As you gain experience, you will need to do this less often.

However, do not write all three voices of each chord as you proceed. You may feel a little more confident about avoiding the breaking of rules by doing so, but you will surely produce dull music. We want rules respected, but we want as beautiful music as possible. This is best accomplished by writing a tentative bass line first for a complete phrase, and testing it by ear.

Now to write the inner voices, we have two choices for each chord, open or close position. Here are some of the combined possibilities which are available to us, at least at first glance, for the first three chords:

Playing these will no doubt indicate that possibilities (a) and (d) have too active, too angular, too disjunct alto and tenor voices and will sound too unsettled, although they break no actual rules. As we have said previously, good parts (melodies) generally are better when smoother. Smooth lines often look dull to a beginning student, but they are not so. Choices (b) and (c) are both good.

Consider the 3rd, 4th, and 5th chords:



Choice (b) has an overlap between bass and tenor. Choice (c) has parallel octaves between tenor and bass. Choice (d) has (b)'s overlap plus a very angular tenor. Choice (a) is the only correct possibility here.

The harmonization will be completed by continuing to weigh possibilities and difficulties in similar manner. When the parts allow it, application of strict chord connection rules usually makes the best music, since it commonly makes the smoothest individual lines.

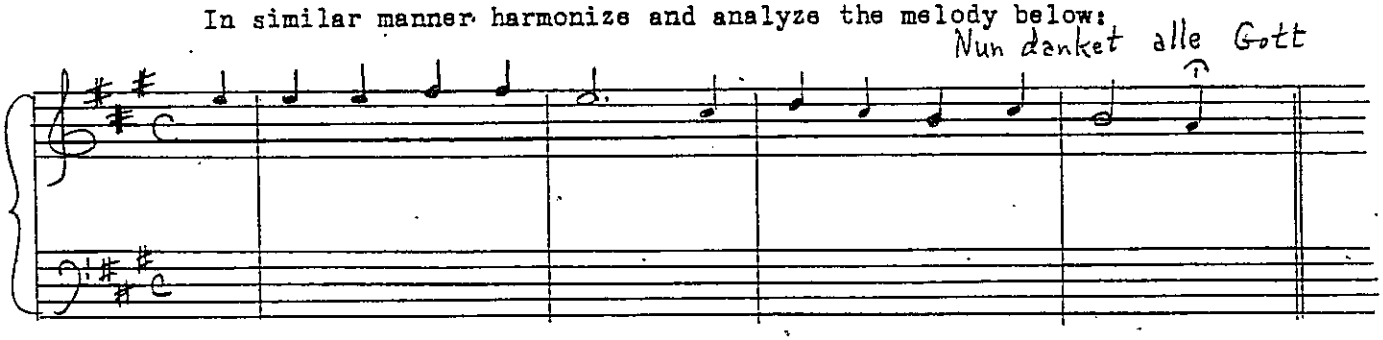
~~(Independent assignment No. 28 is to study the above Topic VII material)~~

Exercise VIIa (~~Independent assignment No. 29~~):

Complete the remainder of the above C Major melody, given at the top of page 3. Always in this assignment and all later ones include key indication and Roman numeral analysis under each chord. This direction is to be assumed even if it is not always specifically stated. Have your instructor check it before you go on.

Exercise VIIb (~~Independent assignment No. 30~~):

In similar manner harmonize and analyze the melody below:



Exercise VIIc (~~Independent assignment No. 31~~):

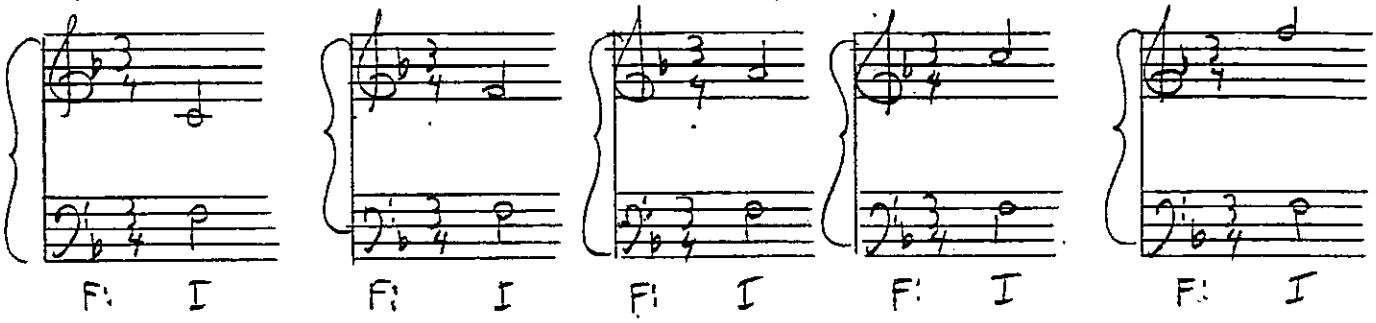
In similar manner harmonize and analyse the melody below:

Harmonizing a bass:

If we have a given bass part, we can also harmonize that. Remember that at present each bass note is the root of its chord. The harmony is therefore already determined. Consider the following bass:

Since each bass note is to be a root, the harmony I, V, I, IV, V, I is assured.

Now, we are to make up an original melody which will fit that harmony pattern and then add inner parts to make either open or close position triads. To do that we can have a choice for each respective note of any of the 3 members of the appropriate chord. The first note could be any of about 5 or more different ones:



One the first tone is chosen, the second tone is a little more limited in order to fit with the first. Consider all possibilities and try them, working one phrase at a time (there is only one phrase in this example) until you get a good melody. Some possibilities will not be available because of rules which would be broken. For example:

wouldn't do because the B-flat and C in the melody would make parallel octaves with the bass, which cannot be changed here.

Neither would:

because of the parallel 5ths.

Considerable trial and error will be necessary, at least until you gain some skill at this writing. This is another reason why working at the keyboard is recommended because some things can be tried without first writing them down.

Analysis:

It is important, too, that we be able to recognize harmonies used in musical literature both by ear and by analyzing the written music. For example, in the following:

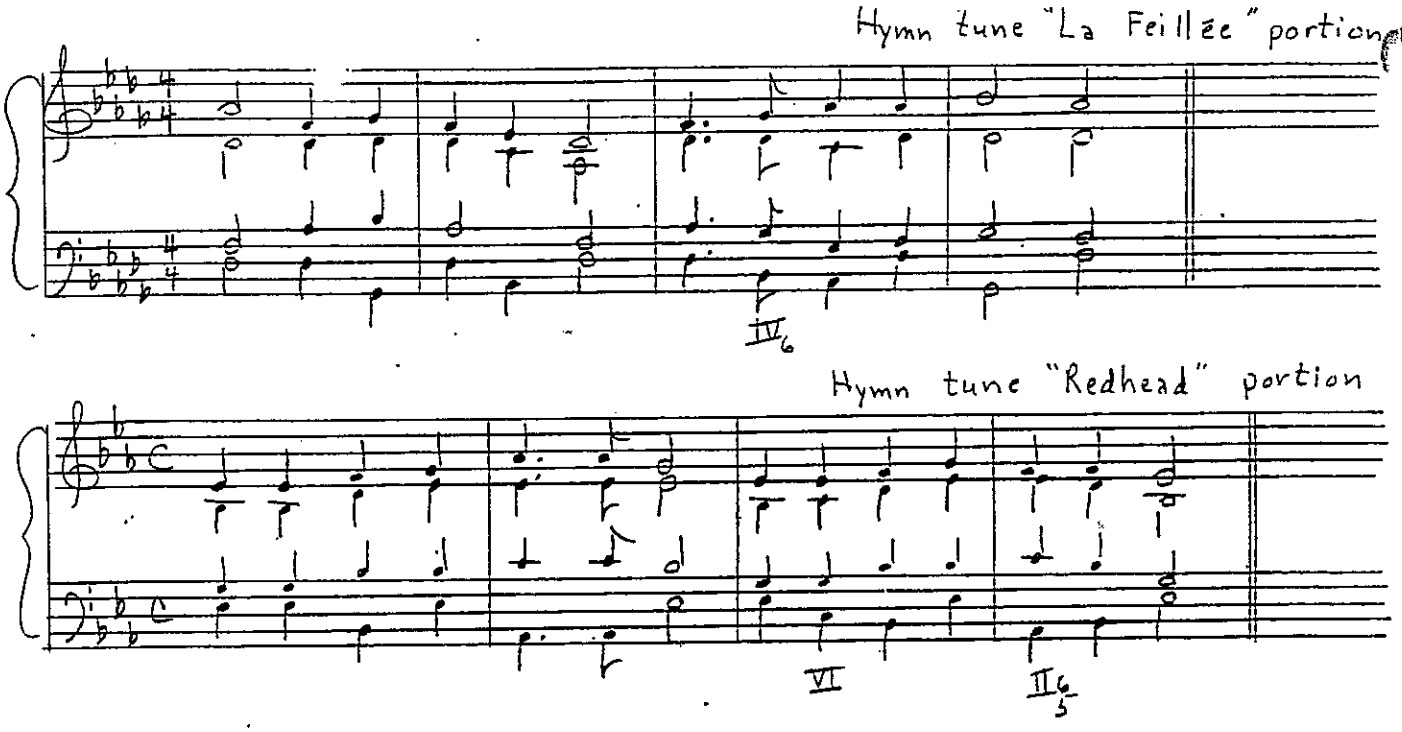
we recognize by chord spellings the harmonies which are used. We will also be pleased to notice how beautifully this example illustrates harmonization principles we have recently been discussing. The starred chord is one we have not yet studied. (It would be a VI.) When analyzing, star or mark in some way chords with which you have not yet dealt. It is suggested that you make a reasoned guess about them.

Exercise VIIb (~~Independent assignment 32 consists of study of the above material and this assignment~~):

Complete the melody and harmonization to the F Major bass line given at the top of page 5. Also complete the following example in similar manner:

Exercise VIIc (~~Independent assignment 33.~~):

Analyze the I, IV and V chords used in the following examples. Chords other than I, IV, and V are already correctly labelled. Analyze by spelling the tones involved at any given moment. For example, the chord on the second beat of measure 2 is made up of the soprano E-flat, the alto C, the tenor A-flat held over, and the bass A-flat, making a V in this key:



Exercise VIId (Keyboard) (~~Independent Assignment No. 34~~):

Harmonize the following short soprano motives at the keyboard, using root position principal triads in open or close position. Avoid hazards such as overlaps, parallelism, etc. Play in any key except C:

1. Number-tones 1 2 3 2 1 (do re mi re do).

2. Number-tones 1 3 4 2 3 (do mi fa re mi).

To the following bass motive, complete the melody and inner parts at the keyboard, using root position principal triads in open or close position. Use any key except C:

1. Number-tones 1 4 1 5 1 (do fa do so do).

Ear Activities:

Melodic Dictation:

In Melodic Dictation, the student writes, in notation on a staff, melodies played for him at the piano. The first tone is announced and he locates the other tones by hearing the successive intervals of the melody. He decides the key by the relationship of these tones. He determines the time signature and rhythmic values by hearing the pulse and accent as played. Occasionally, the key or time signature are announced, if they are confusing, or if it is desirable to direct attention to a special problem.

A melody is played as follows:

1. Once all the way through so the student can "survey" it.

2. From 3 to 5 times each by portions which can reasonably be remembered after one playing, usually about a phrase in length. The student is encouraged to memorize the sound of the tune, like a child learns a rote song, before he begins to dissect it. It is better to close the eyes while listening, and to keep them closed after the playing long enough to think over again the sound of the portion just played. The student is not to watch any notes he may have written while listening. He is to concentrate first on memorizing the sound, then refer to his notes.

3. To link the playing of the portions, this author has found it most successful to play the last note of the portion just finished, in correct rhythmic values and accents, continuing through the next portion. Again play the last note of the preceding portion in correct rhythm each time a given portion is played.

4. After the portions are played, the entire melody is played through again.

The student qualifies in melodic dictation when he has taken, with negligible errors, from 4 to 6 melodies of moderate difficulty designed especially to include somewhere in the 4 to 6 melodies all of the problems included in the discussion in Topic III, page 9, requisite to satisfactory melodic dictation at the normal year-end level.

Topic VIII: Principal Triads in Minor Keys

According to the harmonic form of the minor scale, these are the spellings and qualities of the respective triads in the minor mode:

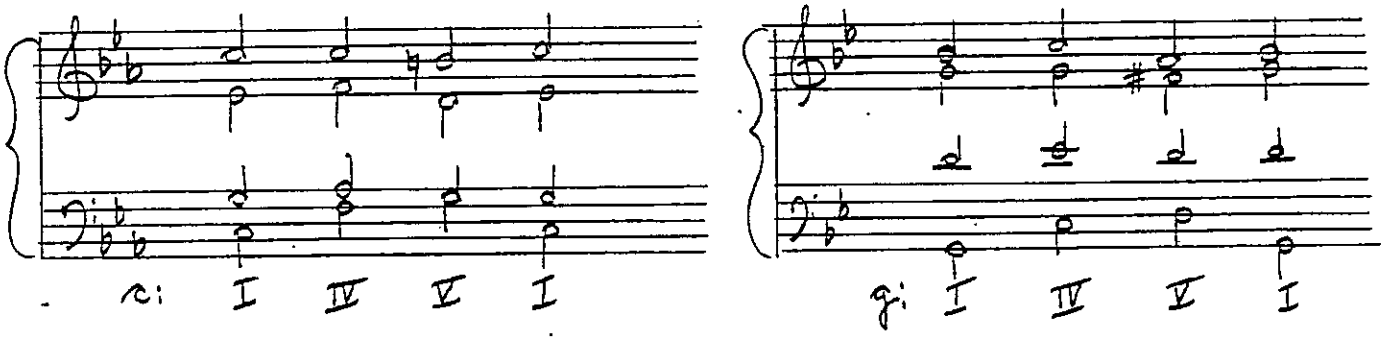
Of the principal triads, I & IV are minor, and V is major. II & VII are diminished and III is augmented. VI is major. II, III, VI & VII will be considered later.

As compared to the major on the same tonic (the parallel), a given minor scale has only two tones different from the major, the 3rd and the 6th. These are called the modal degrees, since they vary only with the mode.

The tonic, subdominant, and dominant tones, being highly significant in key feeling are called tonal degrees. The supertonic also has significant tonal function and may be called a tonal degree, though it is not as basic as the other three. The leading-tone is not classified as either tonal or modal, its function being more particularly melodic. It is not considered a root in the way that the other tones may be.

Tonic, subdominant and dominant triads have the same function in minor mode as they have in major, and the formula I, IV, V, I has the same significance. I & IV are minor while V is major, but the functions have not changed from those of major mode. I is home, V is home-pointing, IV is away from home but related.

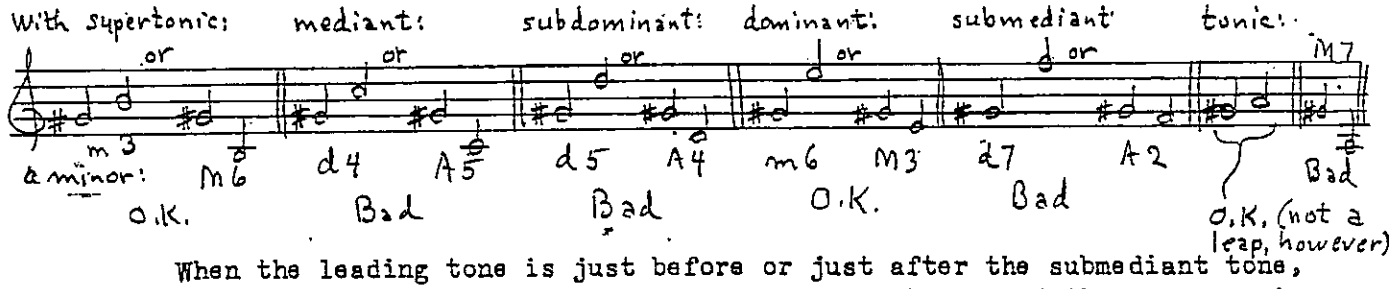
Play, listening thoughtfully:



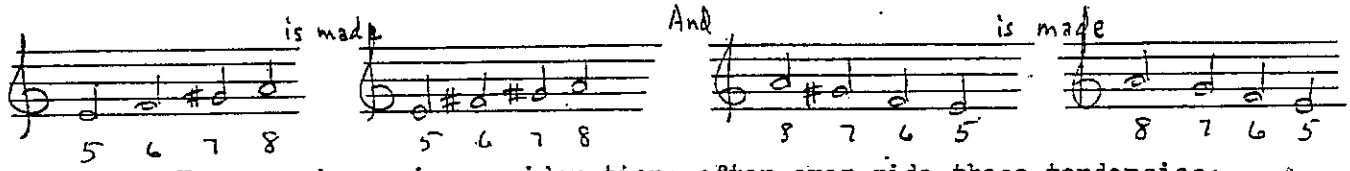
Listen to the previous example without the leading tone raised:

Notice how much it changed the tonal character of the 3rd example to fail to raise the leading-tone. This sounds more like 3 chords from the key of B-flat Major (VI, II, III, VI), or perhaps like 16th century modal music (Aeolian mode). The F # is the critical tone which to a very large extent determines for our ear whether we are in G Minor or B-flat Major. Therefore, failing to write this accidental when it is meant is a more serious matter than failing to write other accidentals. Failing to hear the raised leading tone, or in other words, having the unraised way sound "better", is usually a sign that your ear is oriented to either the relative major or the Aeolian mode, not the true minor key. Listening to more examples of I, IV, V, I with the correctly raised leading tone is therefore needed.

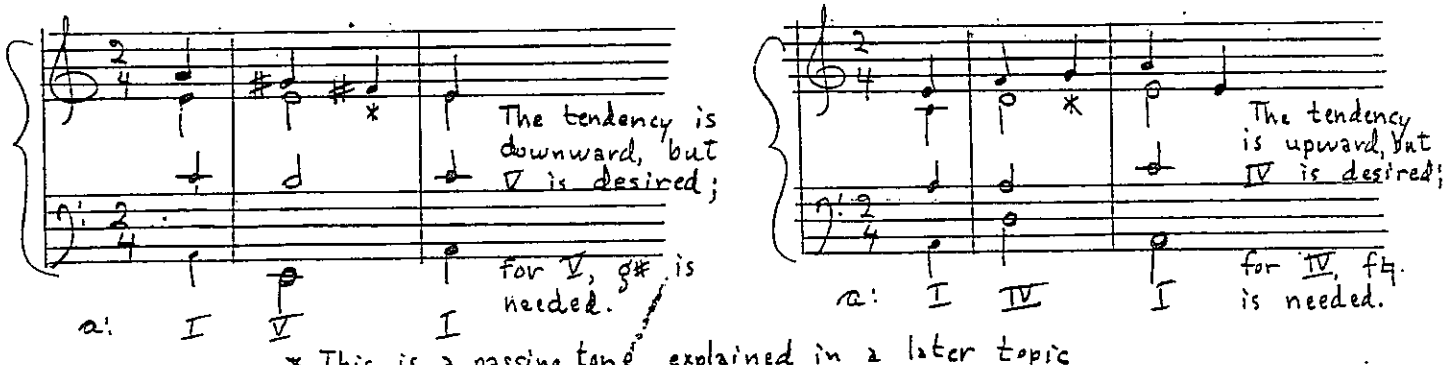
There are considerably more possibilities of dissonant leaps in a given voice when harmonizing minor melodies and basses than there were in major. The leading tone (raised, of course) makes a dissonant interval with as many of the other scale tones as it does not, as illustrated below:


With supertonic: mediant: subdominant: dominant: submediant tonic:
or
M7
a minor: m3 M6 d4 A5 d5 A4 m6 M3 d7 A2 Bad
O.K. Bad Bad O.K. Bad
O.K. (not a leap, however)

When the leading tone is just before or just after the submediant tone, the provisions of melodic minor scale are ordinarily applied. If the sequence is 6, 7, the 6th tone is usually raised to agree with the tendency upward to the 7th and then to the 8th. If the sequence is 7, 6, the 7th tone is usually lowered to agree with the tendency downward:



However, harmonic considerations often over-ride these tendencies:


The tendency is downward, but V is desired;
for V, g# is needed.
a: I V I
The tendency is upward, but IV is desired;
for IV, f♮ is needed.
a: I IV I

* This is a passing tone, explained in a later topic

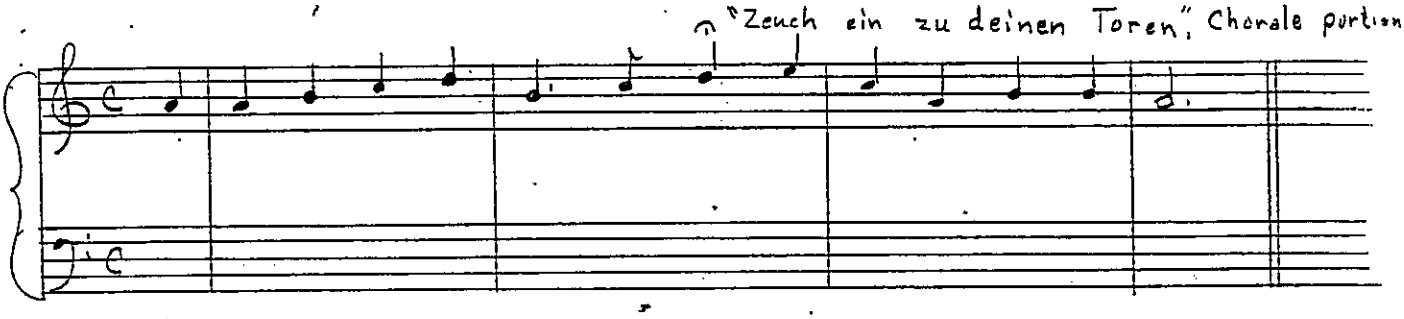
Therefore, each case must be decided according to its own musical merits, and no fast rules hold for all cases. (There will be little or no opportunity to use melodic minor principles in the assignment immediately below, with its limited resources.)

Exercise VIIIa (Independent assignment No. 35 consists of studying the above material and doing this exercise.):

Write the formula I, IV, V, I in strict chord connection rules in two minor keys other than A Minor, beginning once in open and once in close in each of the two keys (four formulas in all). Play these four.

Exercise VIIIb (~~Independent assignment No. 36~~):

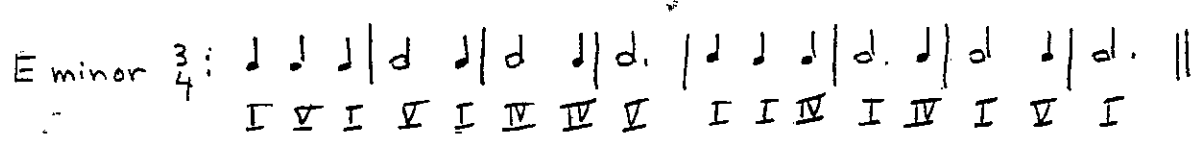
Harmonize the following melody in A Minor, using root position principal triads each in either open or close position. Remember to raise the leading tone, which will be found as the 3rd of each V chord, with an accidental. As before, write the bass tentatively for each phrase before writing the inner voices:



Since the only scale differences between major and minor modes on the same tonic (parallels) are the 3rd & 6th degrees, all that is needed to change any minor piece to its parallel major is to change those degrees. Illustrate this by placing sharps before all the 3rd degrees (C's) and all the 6th degrees (F's) in the exercise just completed, then playing the harmonization, which will be in major.

Exercise VIIIc (~~Independent assignment No. 37~~):

According to the harmonic and rhythmic formula given, make up a melody, then harmonize it. Make up the melody for each phrase of four measures before you write the bass for that phrase. This helps to make your work more musical:



Exercise VIIId (Keyboard) (~~Independent assignment No. 38~~):

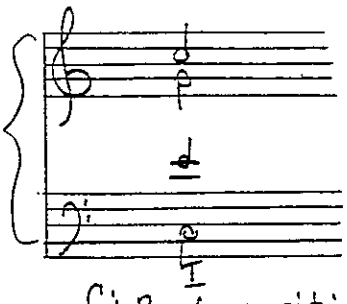
Play for your instructor four realizations of the formula I, IV, V, I, one each beginning in open and in close in each of two minor keys, one having flats in its key signature and one having sharps, using strict chord connection rules. Choose your first soprano note at random.

Also harmonize at the keyboard the following short soprano motive in a minor key of your choice:

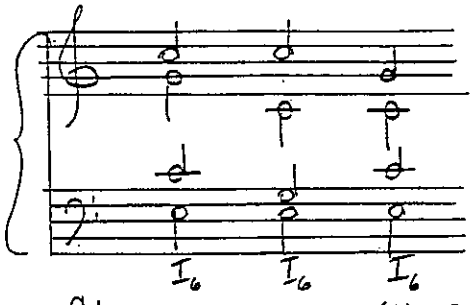
1. Number-tones 1 5 4 2 3 (la mi re ti do).

Topic IX: First Inversions of Principal Triads

Up to now, we have used root position triads only, but chords may have tones other than the root in the bass voice. Such chords are said to be inverted. Triads with the 3rd in the bass are said to be in 1st inversion. In general, inverted triads sound less stable, less final, less solid than those in root position:



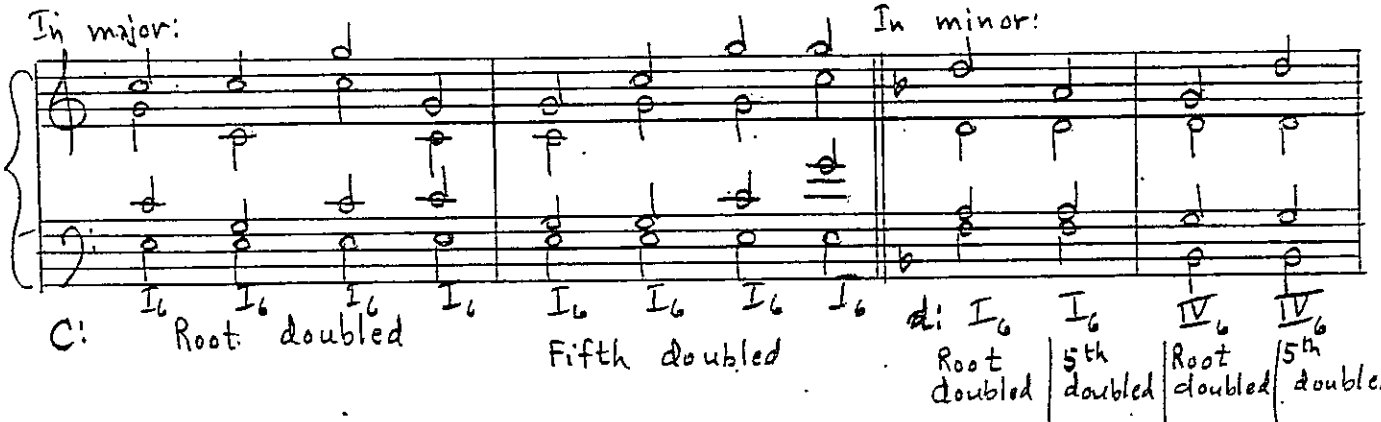
C: Root position



C: 1st Inversion (the 3rd, E, in bass)

An arabic numeral 6 just to the right and slightly below the roman numeral is the most widely accepted symbol for first inversion. This symbol comes from the practice of figured bass, which will be discussed presently. The terms "6th chord" and "chord of the 6th" are synonymous with 1st inversion.

Regarding doubling, the root of the chord is still the most desirable tone to double, as a rule. Notice that the root of the chord no longer always means the bass. The fifth of the chord is also quite good to double, too.



C: Root doubled | Fifth doubled

a: Root doubled | 5th doubled | Root doubled | 5th doubled

The terms "open" and "close" position do not apply to first inversion triads. There is no such thing as an open position 1st inversion triad, or a close.

The 3rd is undesirable to double, especially in major triads. The 3rd is a little like vanilla flavoring in food, a little goes a long way. Play a few examples of 1st inversion chords with 3rds doubled:

Wrong, except in special circumstances:

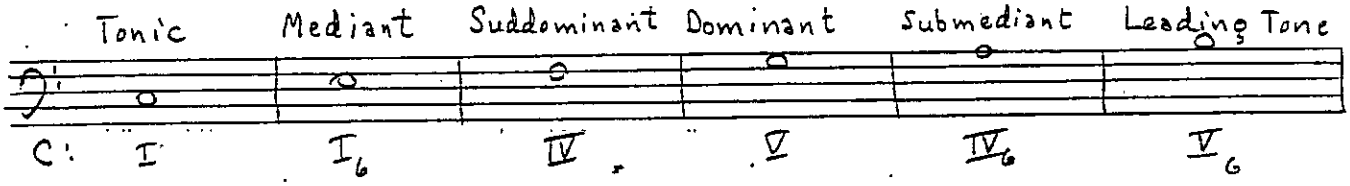
3rd doubled in each chord

Add this matter of undesirability of 3rd doubling to the list of "hazards" to avoid which were discussed on page 1 of Topic VII (Syllabus page 54). Unjustified doubling of the 3rd is regarded as a mistake, but if there is a clear musical advantage to a voice line, the 3rd should be doubled. Whenever you double the 3rd in your writing, explain why in a very brief footnote.

Exercise IXa (~~Independent assignment No. 33 is to study above material and do the~~ following exercise.):

Write on a sheet of staff paper 12 chords, I_6 with root doubled, I_6 with 5th doubled, IV_6 with each doubling, V_6 with each, all done in each of two keys, F Major and G Minor. Don't fail to raise the leading tone in the V chord in minor.

The additional tones made available for the bass by 1st inversions make a much more melodious bass possible. The following tones are now available for the bass voice:



The only tone not yet available for the bass is the supertonic.

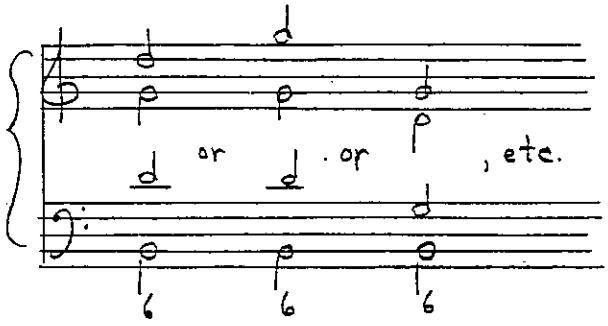
Root position triads which are neither open or close, in other words, triads with the 5th doubled, may now be used when the music is improved by their use. Open and close position are still best, other things being equal. However, avoid having more than an octave between soprano and alto or alto and tenor.

Figured Bass:

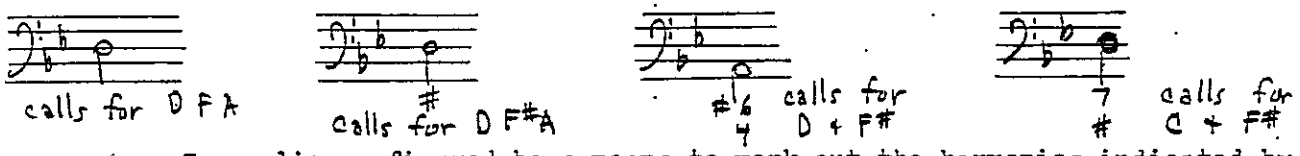
Figured bass was a sort of musical shorthand used extensively in the 17th and 18th centuries to indicate the harmonic make-up of keyboard music. Besides its abbreviation advantage it also left much room for improvising an the part of the performer, a skill more cultivated than by serious musicians than it is today. The practice has some interesting parallels with the jazz improvisation practice of our day.

The figures indicate the intervals to be included above the bass note. The figure 6 is an abbreviation for $\frac{6}{3}$, and it indicates that the 6th and the 3rd are to be included above the bass. They may be simple or compound intervals. Notice that it's the bass note we are placing intervals above, not the root of the chord. From now on, the bass is not always the root. Having no figure appear above a bass note (or below, since it is more common to place the figures under the notes) is understood to mean root position (equivalent to $\frac{5}{3}$). An example:

6th above bass, that is, G, and 3rd above bass, that is, D



The key signature determines whether the tone called for will be a sharp, flat or natural. If a sharp, flat or natural other than that indicated by the key signature is desired, the chromatic is placed beside the figure. A chromatic alone with no figure at all always refers to the 3rd. Examples:



To realize a figured bass means to work out the harmonies indicated by the figures. Notice that it isn't necessary to know very much about Theory to realize a figured bass. One simply reads the code. Realization and analysis are two distinct processes. It is just as possible to learn to realize figured basses with little notion of their harmonic meaning as it is for jazz players to learn to read a "fake book" with little knowledge of harmony.

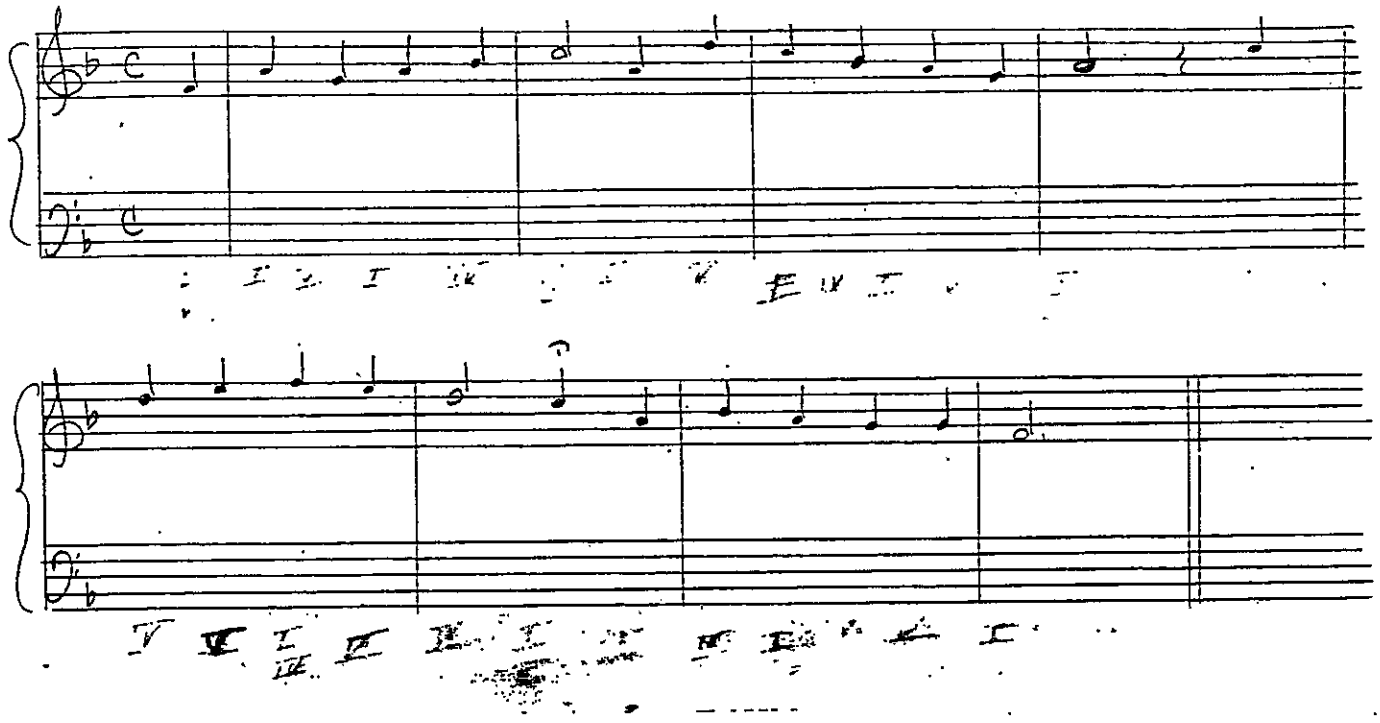
Exercise IXb (~~Independent assignment No. 40 is to study material following assignment No. 39 and do this exercise.~~):

Write the soprano, alto and tenor parts to the following bass, using the harmonies indicated. Work by phrases (two measures each here), write a good melody first, then write the alto and tenor parts:

Exercise IXc (~~Independent assignment No. 41~~):

Harmonize (and analyze, of course) this melody, using root position and first inversion triads. With the increased vocabulary you now have, you ought to be able to make a fine bass line, and consequently a fine piece of music. There is a rather difficult place in the 3rd phrase of this exercise. It is suggested that you contrive to harmonize the first note of that phrase, the C just after

the quarter rest, in close position.



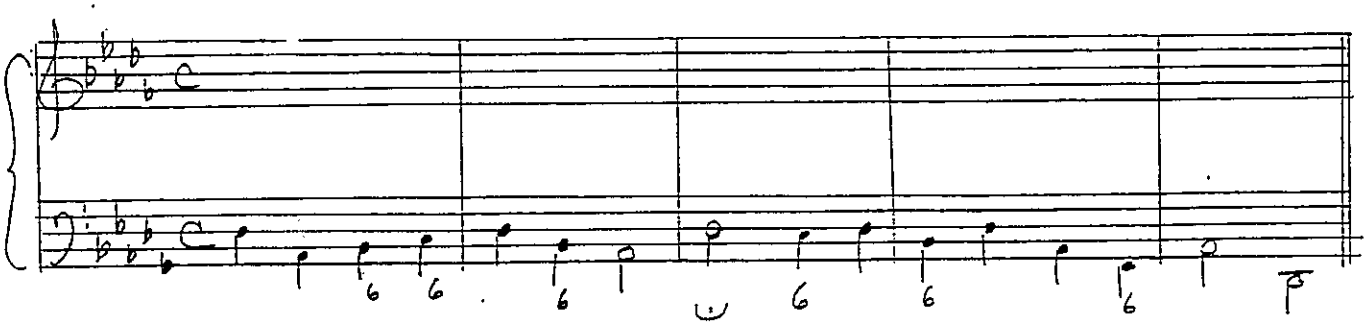
Exercise IXd (~~Independent assignment No. 12~~):

Harmonize the following bass, the great C Minor Passacaglia theme which Bach adapted from a shorter theme by Raison. Where the note is starred, the supertonic is used, which we have not yet learned to use in the bass. Use what we will consider later in detail, a VII^6_5, spelled B D F, with D in the bass, as best you can, at that place. Analyze, also:

Exercise IXe (~~Independent assignment No. 13~~):

Realize and analyze the following figured bass:

(next page)



Exercise IXf (Keyboard) (~~Independent assignment Nov. 11~~):

Harmonize at the keyboard the following short basses, using root position and first inversion triads:

1. In any major key except C, number-tones 1 3 4 5 1

2. In any minor key except a, number-tones 1 6 5 5 1

Ear Activity:

The chief Ear Training Activity making use of first inversion triads, and further resources to be studied later, is an activity which is original with this author, so far as he knows. It drills harmonic resources while it integrates them with melodic dictation at the same time. This is the way one perceives such phenomena in actual music, so it is practical, too.

It is called "Soprano, Bass, and Chords" dictation. An exercise in four parts in chordal style is played. The student takes the soprano in notes in treble clef, the bass in notes in bass clef, and the chords in numerals. Knowledge of part-writing is used also to coordinate these features.

The exercise is played once at moderately rapid tempo for survey purposes, then slowly about 6 times with three different kinds of emphasis: (1) no special emphasis, (2) bass emphasized, and (3) soprano emphasized. The tenor or alto are never emphasized, and a part is never played alone.

Students are encouraged to give whatever emphasis they are able to give to hearing the chord functions as entities rather than simply as analytical guesses or results from the parts taken by melodic dictation. This is the reason the alto or tenor are never emphasized-- to prevent taking 4 parts by melodic dictation and simply analyzing the results intellectually. After a student has the soprano and bass in notes, and numerals written, he is encouraged, as a challenge, an extra, to attempt to write the tenor and alto in notes. To do this he is encouraged to try to predict what the alto and tenor ought to be by his knowledge of part-writing, then to check by ear to see which of such possibilities were used. A student always experiences a sense of real gratification when he manages to write all four parts of an exercise and realizes he has done this by ear and by knowledge.

Here are several examples of such exercises using a harmonic vocabulary of I, I_6, IV, IV_6, V, & V_6, the resources studied to this point:

Creative Activity:

Probably the most powerful motivation in learning is the use of creative activity, the originating and carrying through of one's own ideas. In music, this usually means composing, but not necessarily. Most people can and should compose, not to become Composers in the austere and soul-consuming sense, but because one doesn't really understand musical materials until he has bent them in some way to his own purposes. Students of English think it reasonable to be expected to write "themes" or "essays"; students of Music should likewise think it reasonable to be expected to write music.

However, there do seem to exist some music students who are either so overwhelmed by the prospect that they are creatively paralyzed, or who do not yet exhibit creative powers to a degree which they can use for a beginning. Some special assignments for them will usually be available in this syllabus.

With the study of first inversions, the student now has sufficient resources that he can create a melody and harmonization with which he will be relatively pleased.

The assignments below are arranged in approximate order from those demanding greatest creative activity to those demanding least. Every student can surely find one of these which he can do with some sense of gratification.

Exercise IXg (Independent assignment No. 45):

Complete <u>one</u> of the following creative assignments:

1. Write a melody about eight measures long, using two phrases of about four measures each, in generally traditional style. Harmonize your melody.

You may use 2 or 3 ideas beyond those you have studied, if you wish, but have your example such that it chiefly reflects materials you have studied up to this point. You may also write this for instruments familiar to you. Analyze all harmonies used.

2. Set to music one of the following texts, or a similar text found elsewhere, in four parts, soprano, alto, tenor and bass, using generally traditional style. You may use 2 or 3 ideas beyond those studied, if you wish, but reflect chiefly materials studied. Analyze.

To do this you must "scan" the natural accent of the words, so that the rhythm of your melody will agree with them. Mark the accented words, then write a melody which is compatible with that rhythm, which agrees in mood and spirit with the words, and which is beautiful for itself. The masters always write the music to words already chosen, never the opposite:

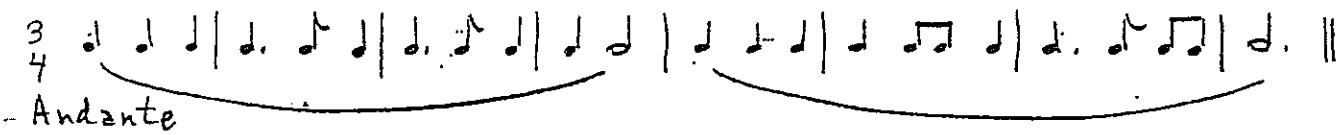
(a) The Lord is in His Holy Temple.
Let all the Earth keep silence before Him.

(b) Heaven and earth, and sea and air,
All their Maker's praise declare.

(c) Let not Death boast his conquering power,
She'll rise a star that fell a flower.
(17th c. anon.)

(d) Of Life immense in passion, pulse, and power,
Cheerful, for freest action form'd under the laws divine,
The Modern Man I sing.
(Whitman)

3. Write a melody to the following rhythmic pattern. Harmonize it. Analyze it:



4. Here is the first phrase of a melody. Write a second phrase to to with it. Then harmonize both. Analyze.

Exercise IXx (~~Independent assignment No. x~~):

Do any others of the above, or repeat the one you did, for extra credit.

Topic X: Non-Harmonic Tones

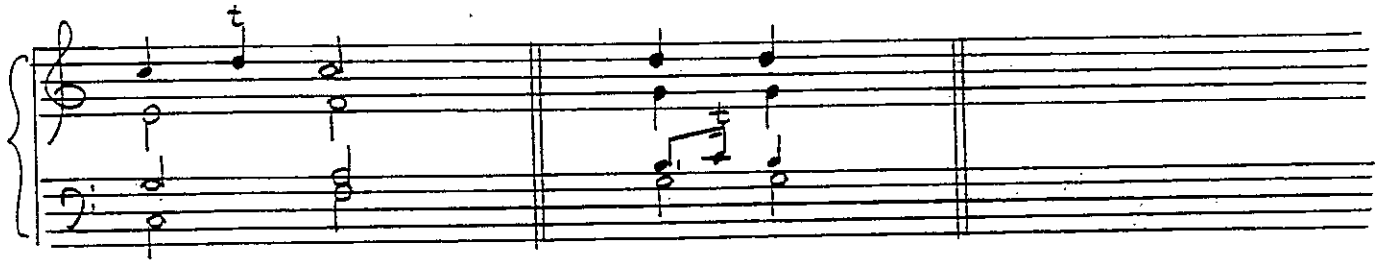
Up to this time, we have used only tones which are members of the prevailing harmony. Non-Harmonic Tones (also called Non-Chord Tones, Ornamental Tones, or Embellishments by some authors) are temporary tones which are not members of chords with which they sound. They are temporarily dissonant, meaning that they bring into play intervals which are classed as dissonances. All such intervals must be resolved, meaning that the tension of their dissonance must be relieved by having the voice which has the dissonant tone proceed smoothly to one which is consonant. These tones are variously named and classified by different authors and scholars. Be sure you understand the essence of each thoroughly so that you will recognize it if you encounter it called by a different name. The presentation given below represents a widely held view as to definition of each non-harmonic tone.

I. Unstressed Non-Harmonic Tones

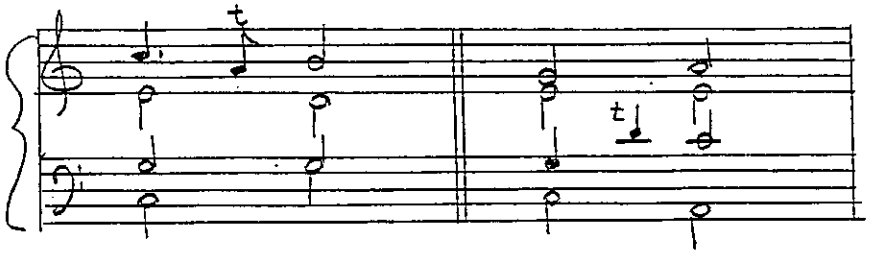
Unstressed means occuring between points of rhythmic or harmonic stress or accent relatively greater than the nonharmonic tone. An unstressed tone seems to be "between" the chords.

1. The passing-tone, abbreviated "p", is usually reached by step and resolved by step in the same direction. It may be used as an intermediate note when a voice moves the interval of a third:

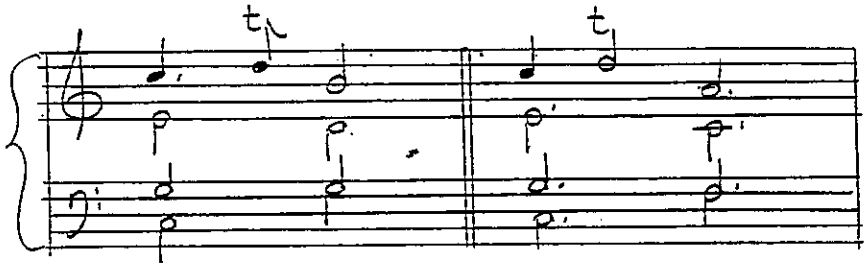
2. The turning-note, abbreviated "t", is usually reached by step and resolved by step in the other direction. In such case, synonyms for it are auxiliary, returning tone, nebenton, neighboring tone, embellishment or alternating note. Such cases are called strict turning-notes. The turning note may be used when a voice repeats or holds the same note:



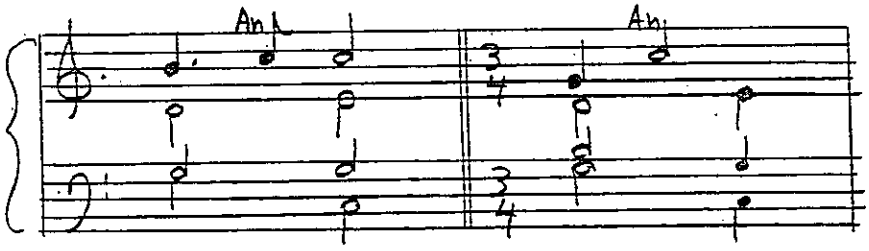
The turning-note may be reached by skip and resolved by step in the other direction. This would be one type of free turning-note. This is synonymous with the cambiata of Piston:



. . . It may also be reached by step and resolved by skip in the other direction, in which case it is synonymous with escape tone or echapee. This is another type of free turning-note:



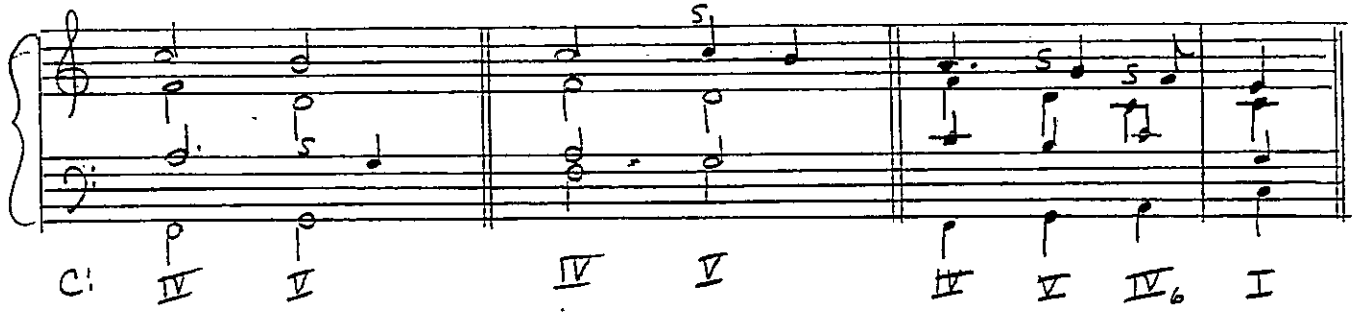
3. The anticipation, abbreviated "an", is approached by skip or step and resolved by prolongation (meaning either holding the same tone or repeating it). It is often used when a voice moves stepwise:



II. Stressed Non-Harmonic Tones

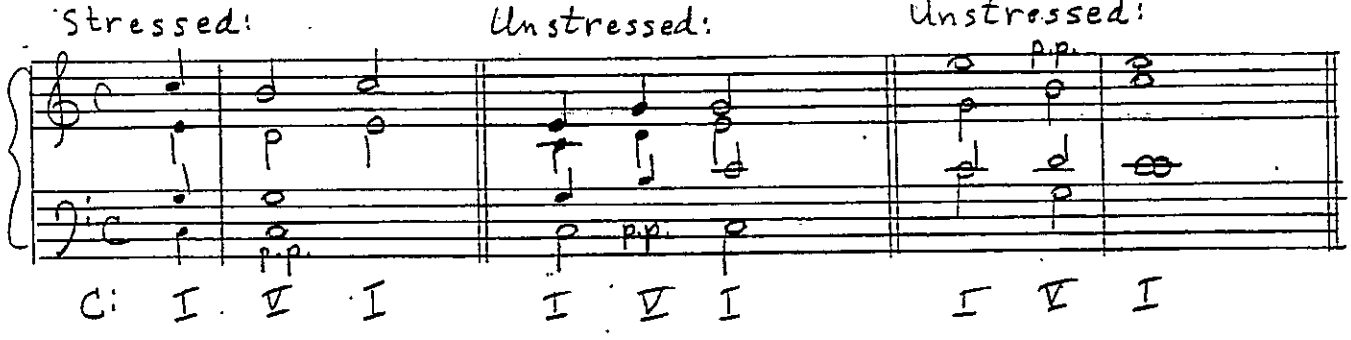
4. The appoggiatura, abbreviated "ap", is a stressed non-harmonic tone approached by step or skip, and resolved by step. It has no widely used synonyms, but it has sometimes been called an unprepared suspension. An appoggiatura may be used on voices being approached in almost any way, stepwise, repeating or leaping:

5. The suspension, abbreviated "s", is a stressed non-harmonic tone approached by prolongation and resolved by step. A synonym is retardation. A suspension differs from an appoggiatura only in that it is approached by prolongation, in other words, prepared. "Prepared" means that the non-harmonic tone is in the same voice in the previous chord as a harmonic tone. The suspension may either be tied over (or dotted) or repeated. A suspension may be used when a voice moves stepwise:



III. Stressed or Unstressed

6. The pedal point is often a longer device than one tone. However, as a single tone, it belongs in the present discussion. The pedal point as a single tone may be either stressed or unstressed. It enters by prolongation and leaves by prolongation. Its name comes from its typical use in organ music in the bass voice, played by the pedal keyboard. Synonyms are lying voice, organ point, point d'orgue. It may be viewed as a stubborn tone which sticks after the chord has moved on, then until the chord moves on or back to a harmony with which the stubborn tone again agrees:



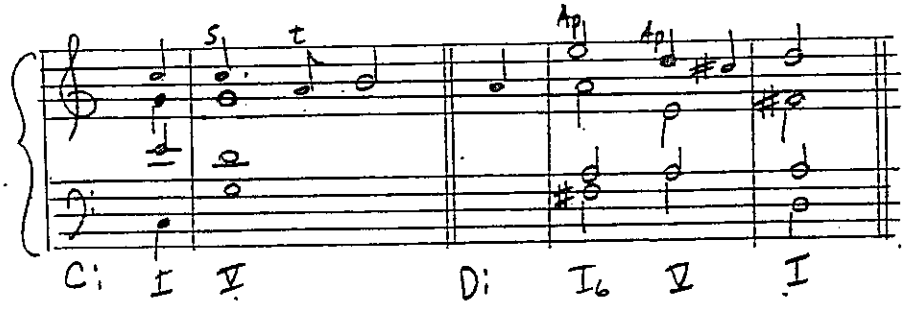
The first example above could be analyzed quite reasonably as two appoggiaturas, in soprano and alto, called double appoggiatura. In any such alternative, choice of analysis should be made on the basis of hearing the music played or sung at a correct tempo.

Here is a table summarizing the above information about all non-harmonic tones:

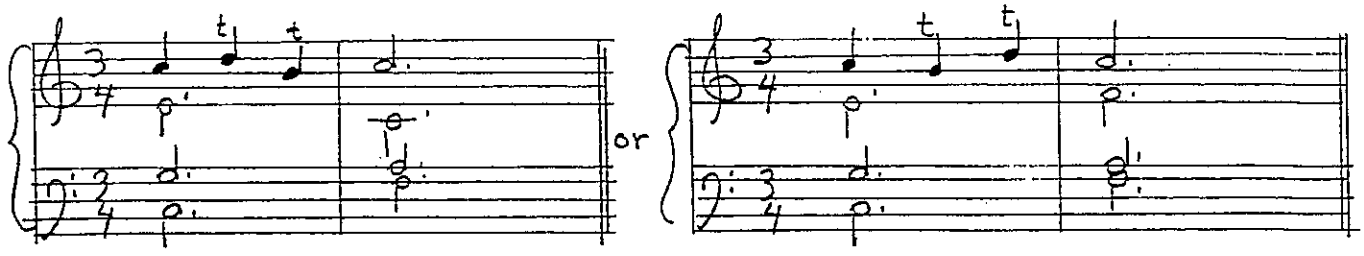
Name & Abbrev.	How reached	How resolved	Synonyms
I. Unstressed			
1. Passing tone (p)	step	step in same direction	strict passing-tone
	skip	step in same direction	free passing-tone
	step	skip in same direction	free passing-tone
2. Turning-note (t)	step	step in other direction	auxiliary; returning-tone; nebenton; neighboring tone; embellishment; alternating note
	skip	step in other direction	cambiata; free turning-note reached by skip
	step	skip in other direction	escape; echapee; free turning-note left by skip
3. Anticipation (an)	step or skip	prolongation	
II. Stressed			
4. Appoggiatura (ap)	step or skip	step	unprepared suspension
5. Suspension (s)	prolongation	step	retardation
III. Stressed or Unstressed			
6. Pedal point (pp)	prolongation	prolongation	organ point; lying voice; point d'orgue

There are several general observations to be made which apply generally to all of the above:

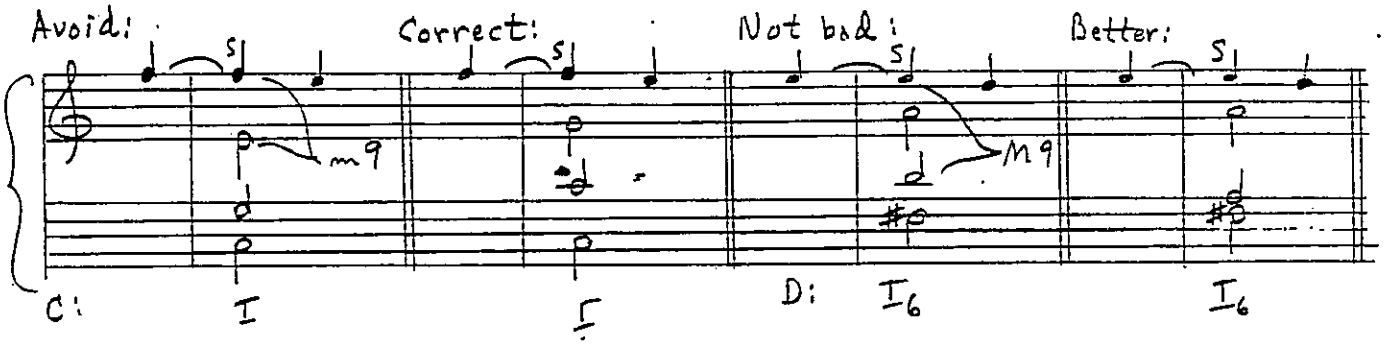
(a) Non-harmonic tones may be combined sequentially with other non-harmonic tones, including their own kind. For example:



The combination of upper turning note with lower is common enough to be given a name, changing note:



(b) Appoggiaturas and suspensions represent the note to which they will resolve; in other words, they temporarily take the place of the note of resolution. It is better to omit the note of resolution itself in another voice of the chord. "Save a place" for the note of resolution. This is especially true if the nonharmonic tone and its resolution tone would be a minor 2nd or minor 9th apart:



(c) Parallelism is objectionable wherever it will be heard. Be careful that non-harmonic tones you insert do not make parallel octaves or fifths. For example, all of the following are objectionable:

(~~Independent assignment No. 46 is to study Topic X to this point.~~)

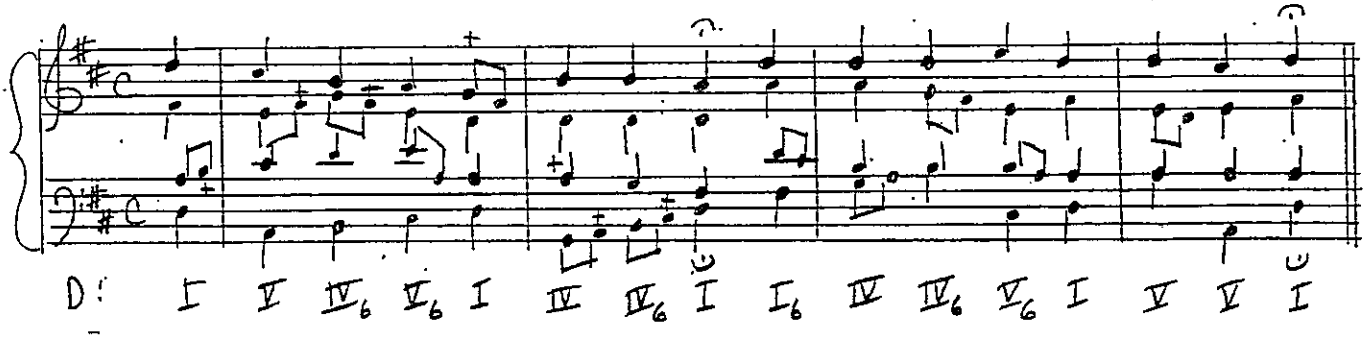
Exercise Xa (~~Independent assignment No. 47~~):

Write two original examples of each, passing tone, turning-note, anticipation, appoggiatura, suspension, and pedal point, one each in any minor key and

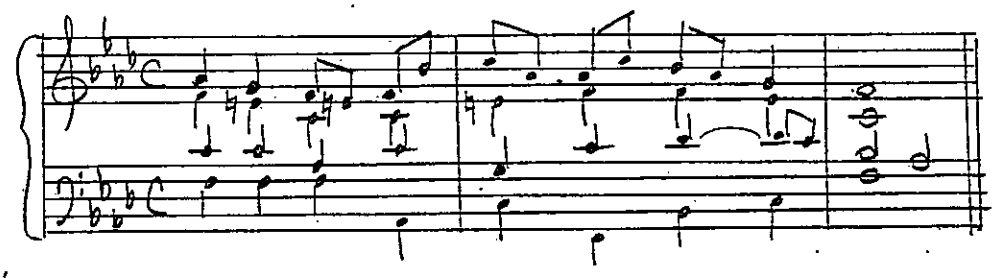
one each in any major key. Try not to have the nonharmonic tone in the same voice as it is in the given examples. Work preferably at the keyboard. Use only those harmonic resources you have studied up to now, and be careful that your part-writing is good (no parallelisms, double 3rds, overlaps, etc.).

Exercise Xb (~~Independent assignment No. 48~~):

In the first phrase of the following, label all nonharmonic tones, which are marked with +. In the second phrase they are not marked; you are to find each one and label it:



Analyze the following completely, including correct key, chord numerals, and nonharmonic tones:



Exercise Xc (Keyboard) (~~Independent assignment No. 49~~):

Play formulas at the keyboard illustrating one example of each of the six non-harmonic tones each in a different key, with both major and minor modes represented. It will simplify this activity if you will remember the kind of voice motion with which each fits best, for example, passing tone fits in a voice moving a 3rd, etc.

Use exactly the same example for your appoggiatura as for your suspension, but with different preparation chord.

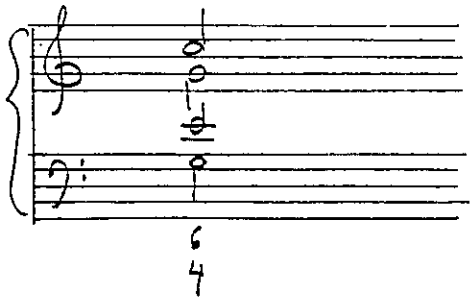
Exercise Xx (~~Independent assignment x~~):

Write another creative assignment, either your own or like Topic IX.

Topic XI: The $\frac{6}{4}$ Chord

The $\frac{6}{4}$ Chord is the <u>second inversion</u> of a triad. It has the 5th of the triad in the bass voice.

The second inversion of a triad would, according to the principles of figured bass, be called for by the symbol $\frac{6}{4}$ under a bass note:



6 calls for E and 4 calls for C above the bass G, amounting to a C E G triad with G, the fifth, in the bass.

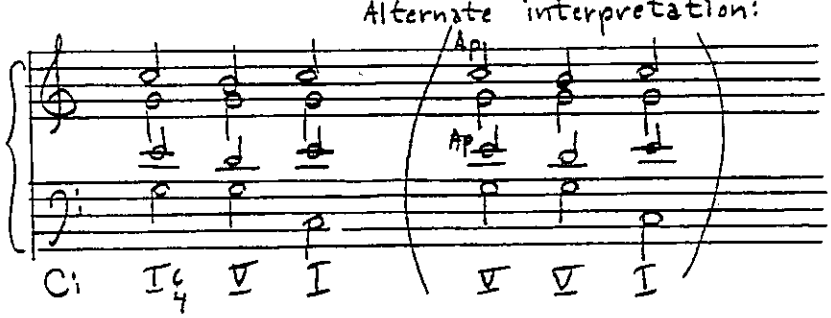
In Topics V and IX we said that root position triads were fundamental, and that first inversion triads were less stable, less final, less solid than root position triads.

Second inversion triads, having the fifth in the bass, are so much less stable that they are almost useless in music, except for one very valuable and important use, that in the <u>cadence</u>, or ending, which will be discussed presently.

This chord is best understood as a dissonance. The idea of the second inversion triad acting as a dissonance is important, but is sometimes troublesome to students. The musical ear hears this inversion as a dissonance, a tension needing relaxation, an unstable sound needing progression to something more stable. It is a sort of non-harmonic "chord", needing care in approach and in leaving. The reason is probably the same as the reason a musical ear hears the interval of a perfect fourth as a dissonance, needing resolution to a 3rd, since the bass of the second inversion triad makes the interval of a perfect 4th with the root of the triad, which will be in a higher voice. But this reason is also rather mysterious, since vibration ratios indicate that the 3rd is more dissonant than the perfect 4th. Whatever the reasons, both are definitely dissonant to musicians.

We said that the cadence $\frac{6}{4}$ was the only really valuable use of this inversion. You are already aware of the strength and finality of the V I ending, or cadence, having used it constantly. By preceding the V chord with a I $\frac{6}{4}$, the sense of suspense, of tension, which is finally resolved in the I, is further extended and therefore intensified.

In the following example of cadence $\frac{6}{4}$, the I $\frac{6}{4}$ sounds charged with a strong urgency to move into the following V, with the C, which is the 4th above the bass, and the E, the 6th above the bass, acting as appoggiaturas needing stepwise resolution, adding to the V's already strong tendency to move to the final I:

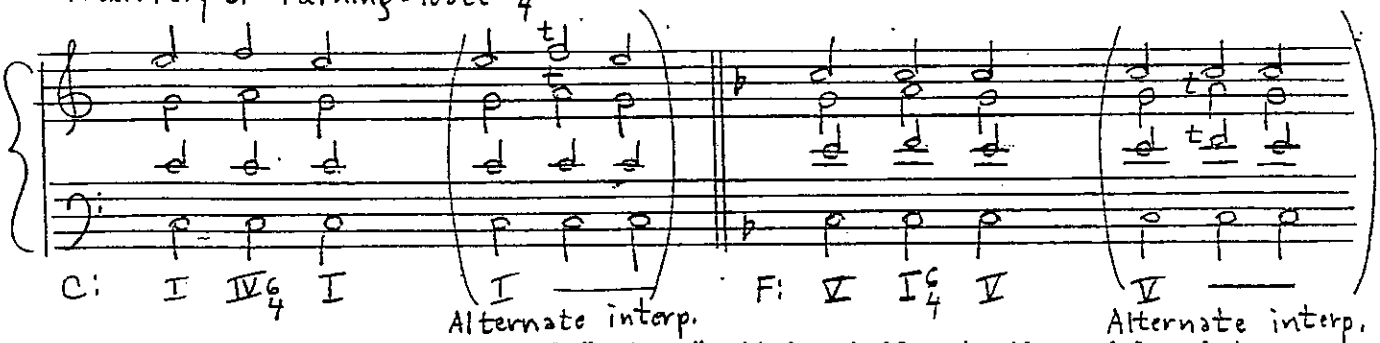


The 6th and 4th of the I $\frac{6}{4}$ normally descend stepwise into the V, and the bass (the 5th) of the I $\frac{6}{4}$ is usually doubled. Much of the effect of the cadence $\frac{6}{4}$ is lost if these two voices do not descend stepwise. Sometimes they cannot do so, however.

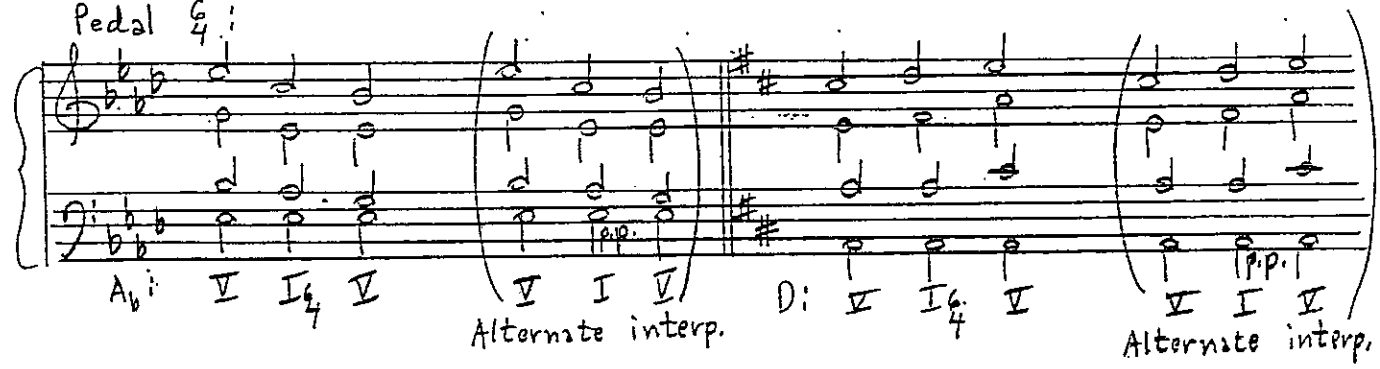
The example just given, I $\frac{6}{4}$, the cadence $\frac{6}{4}$, is by far the most useful $\frac{6}{4}$. But there are other uses which are acceptable, all treating the $\frac{6}{4}$ as a dissonance, needing careful approach and leaving.

Most of these cases use a "straight-line bass". In other words, the bass note before the $\frac{6}{4}$, the bass note of the $\frac{6}{4}$, and the bass note after the $\frac{6}{4}$, are in a straight line, either by repeating the same note or by using stepwise motion.

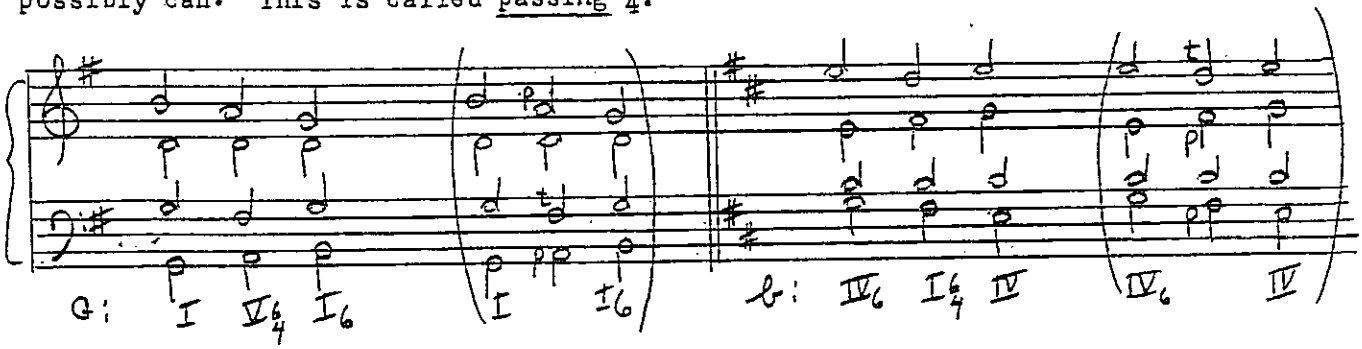
1. When the bass is the same through three chords, the middle one of which is a $\frac{6}{4}$, the dissonant nature of the $\frac{6}{4}$ expresses itself in its similarity to the auxiliary (turning note) or to the pedal point. Its resolution is the result of the resolutions of its tones. It is called auxiliary or turning $\frac{6}{4}$:



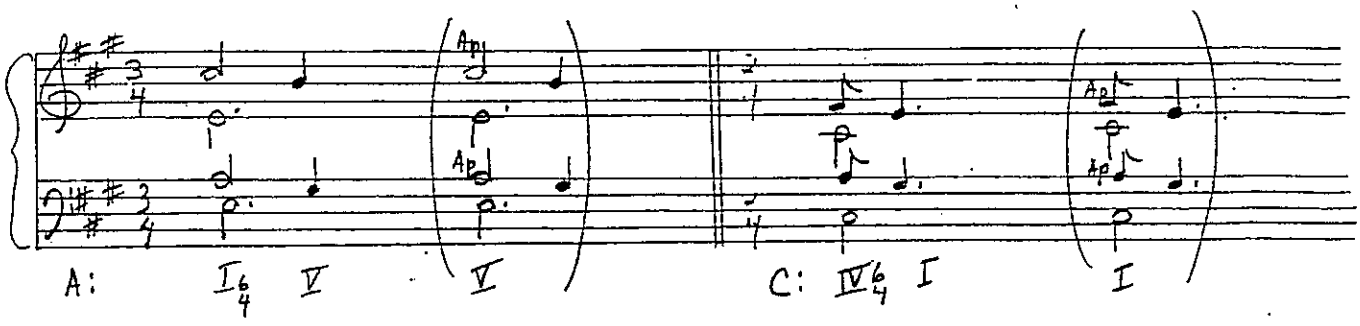
Or, if the tones do not "return", it is similar to the pedal point, and may be called the pedal $\frac{6}{4}$:



2. When the bass moves stepwise in the same direction through three chords, the middle of which is a $\frac{6}{4}$, the $\frac{6}{4}$ justifies its dissonance by having its bass act as a passing tone. Other voices should also move stepwise if they possibly can. This is called passing $\frac{6}{4}$:



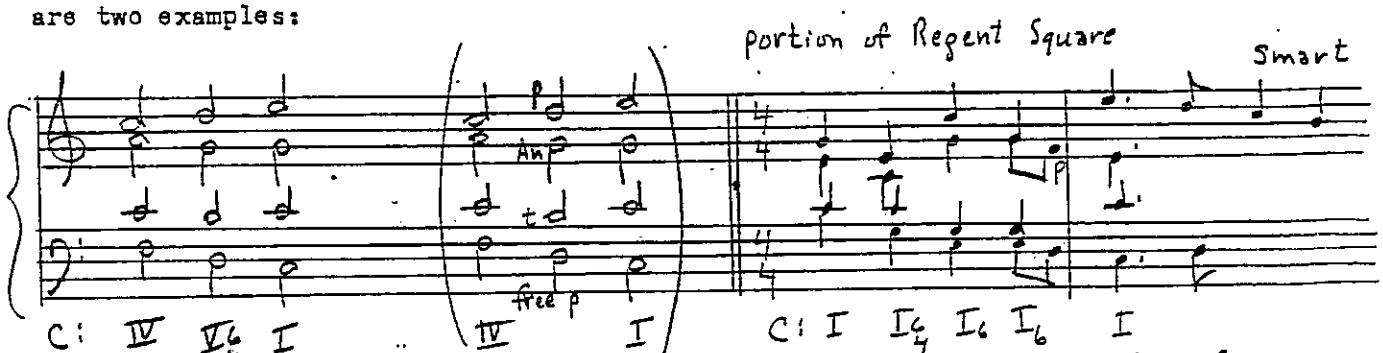
Another acceptable non-cadence use is the appoggiatura $\frac{6}{4}$. When the $\frac{6}{4}$ is stressed relative to the following chord, it acts as an appoggiatura:



When the appoggiatura $\frac{6}{4}$ consists of I $\frac{6}{4}$ followed by V, it is equivalent to a cadence without the final I. This is very useful in phrases ending on the dominant. Phrases ending on the dominant are called half-cadence. Here is an example:

Appog. $\frac{6}{4}$ used in half-cadence

Other situations are found in the works of respectable composers which use $\frac{6}{4}$, but they take the above principles into account. The $\frac{6}{4}$ is either treated as a dissonance or its dissonance is "justified" by other musical factors. Here are two examples:



Bass is nearly enough "stepwise" to be acceptable.

Vigorous bass line has $\frac{6}{4}$ as a "step" in moving across members of I.

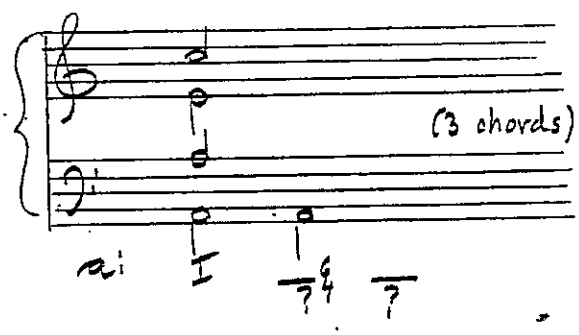
Exercise XIa (~~Independent assignment No. 50 is to study the material on Topic XI and do the following two examples of cadence $\frac{6}{4}$.~~)

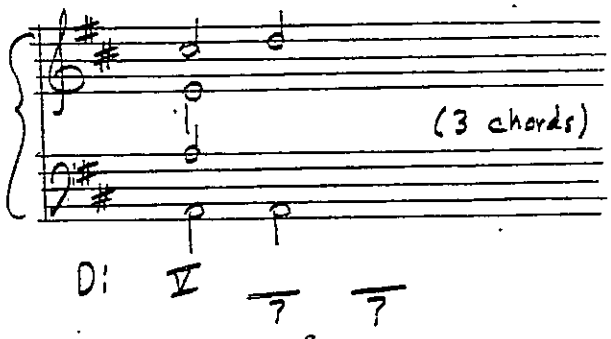
(Independent assignment No. 51 is to complete the remainder of Exercise XIa.)

Complete the following examples to make good examples of cadence $\frac{6}{4}$. See that your writing reflects your understanding of the $\frac{6}{4}$ as a dissonance, and that

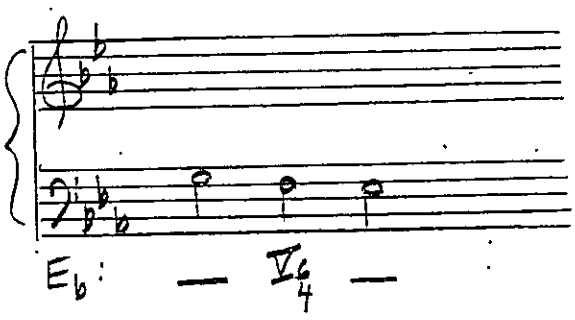
in the cadence voices move stepwise downward from the I $\frac{6}{4}$ to the V whenever possible.

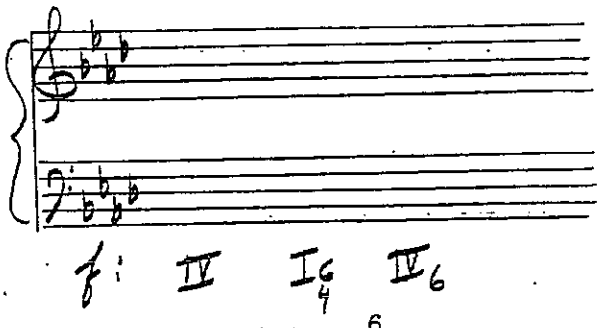
Complete the following to make examples of <u>auxiliary</u> $\frac{6}{4}$:



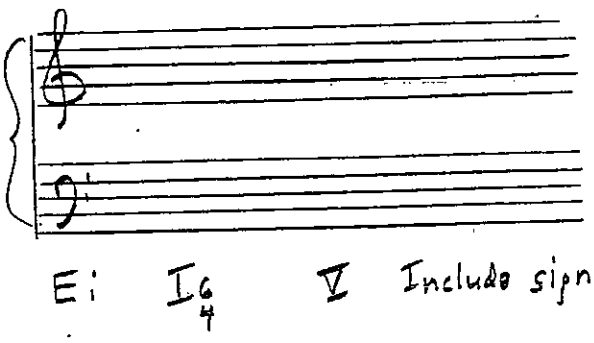


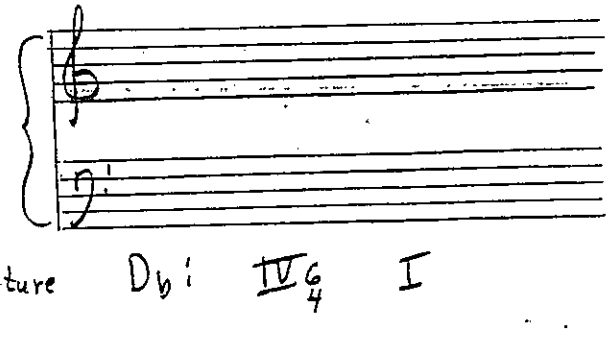
Complete the following to make examples of <u>passing</u> $\frac{6}{4}$:





Complete the following to make examples of <u>appoggiatura</u> $\frac{6}{4}$:

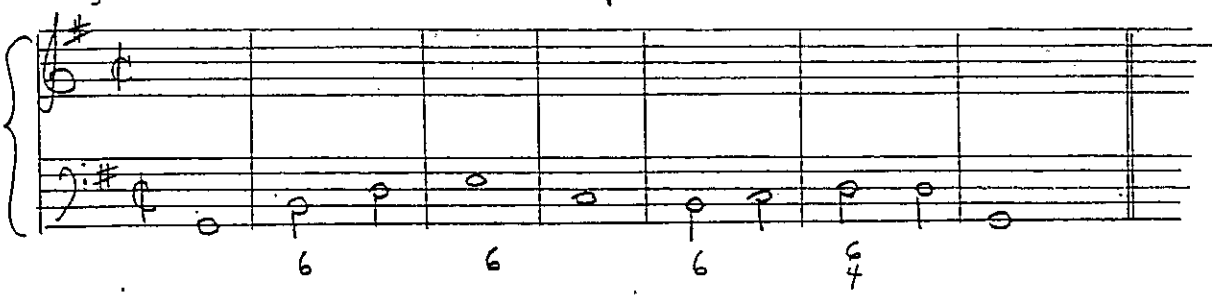




(assignment continued on next page)

Realize the following figured bass strictly. In a strict treatment of figured bass, one may not use harmonies or non-harmonic tones that are not called for. Since realizing a figured bass takes little or no harmonic ability, be sure to exercise your ear and initiative by writing a fine melody. Analyze:

Begin with the 3rd in the soprano:



Exercise XIb (Independent assignment No. 52) (Keyboard)

Play cadences I IV I $\frac{6}{4}$ V I (the familiar I IV V I with I $\frac{6}{4}$ inserted in the appropriate place) in the keys of D-flat Major and E Minor.

Ear Activities:

Soprano, Bass and Chords dictation using second inversion principal triads may be introduced when that using only first inversion has been partially assimilated.

We have now introduced all ear skills outlined in Topic III, page 7, as a minimum to be achieved by the average student. Individuals will need to drill according to their separate needs, and the classroom teacher should rotate drilling on ear skills until each person qualifies in each skill.

Students capable of achieving Ear Training skills beyond those outlined should be challenged and encouraged to do so. Such supplementary skills include hearing II, III & VI harmonies, nonharmonic tones, seventh chord qualities, secondary dominants and modulations. From time to time, the classroom teacher should introduce each of these skills to the whole class, to demonstrate how to drill each, in order to keep the class sufficiently challenged. However, extensive drill in each should be left to an individualized Ear Training Lab or to individual student drill.

Introduce non-harmonic tones with two-chord and three-chord examples, similar to those done for keyboard activity, calling on students to identify the non-harmonic tones.

Soprano, Bass and Chords dictation using non-harmonic tones may then be introduced. Place nonharmonic tones in either soprano or bass voice. Begin with passing tones and turning notes, then add anticipations, then suspensions, appoggiaturas, and pedal points.

One can meet the needs of both groups, those still working on minimum goals and those working on supplementary goals, in the same class, by simply identifying which chords the slower group is not responsible for, but inviting them to guess.

Exercise XIc (Independent assignment No. 53 and No. 54)

Harmonize the following melodies, using any means studied up to now. In harmonizing melodies, imagine how each proposed harmony or part will sound, then test it by playing at the keyboard. Students whose ear ability is good may write, without testing, any items they can hear mentally for certain. For many students, that will mean working directly at the keyboard and testing constantly. This is slow work at first, but indispensable, and ultimately it is the quicker way. Write the bass for a whole phrase before writing the alto and tenor. Analyze:

"Hyfrydol" (Welsh)

American Folk Song

Exercise XIx (Independent assignment x)

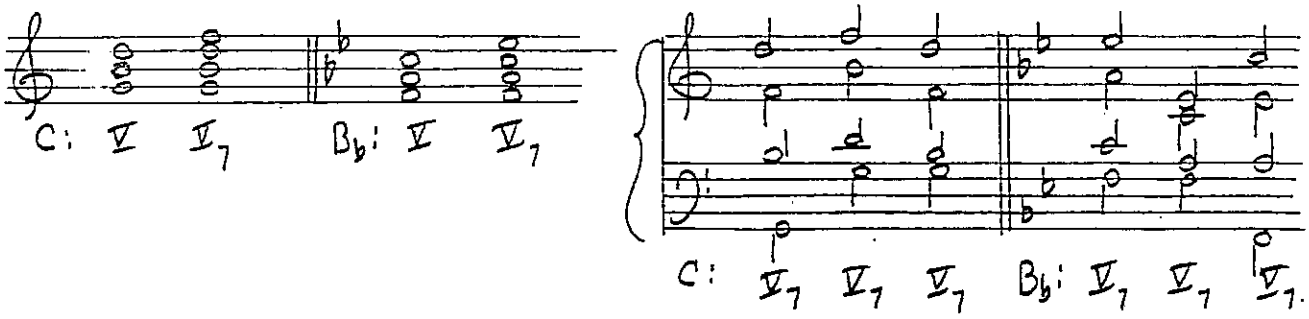
1. Write as beautiful an alto part as you can. Then add soprano, tenor, and bass parts to make a four-part harmonization. Or do the same for the tenor. Analyze.

Or,

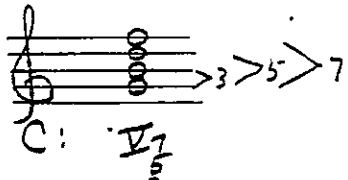
2. Write an instrumental trio for 3 string instruments, 3 woodwind, or 3 brass, or one of each. Part-writing principles for 3 parts are generally the same as for 4. Analyze.

Topic XII: The Dominant Seventh

We now come to the consideration of our first seventh chord or tetrad. The dominant seventh chord is a seventh chord built on the dominant of the key, by placing one more 3rd above the tones of a major triad:

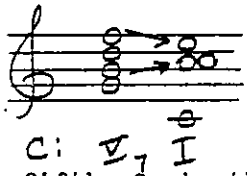


V_7 is the accepted abbreviation for dominant seventh. The complete form from which it is abbreviated is $V\,{}^{7}_{5}{}^{}_{3}$. This is derived from figured bass practice, like our previous chord symbols:



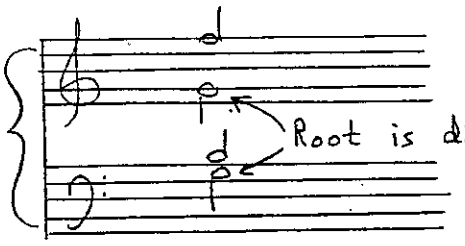
The dominant seventh chord contains two dissonant intervals which must be resolved in the next chord, a minor seventh and a diminished 5th. These intervals are involved with the two strong tendency tones of a key, the leading-tone and the subdominant. In other words, if the leading-tone and the subdominant be properly resolved in the next chord, the dissonant intervals will also be. This combination of interval dissonance resolution with tendency tone resolution makes the dominant seventh chord extremely significant in establishing tonal feeling when it is followed by its inevitable I. In fact, this progression was historically significant in bringing about tonal consciousness at the beginning of the whole period of common harmonic practice.

Of course, then, the leading tone is obligated to move to the tonic tone in the same voice, and the subdominant tone is obligated to move to the mediant tone in the same voice:



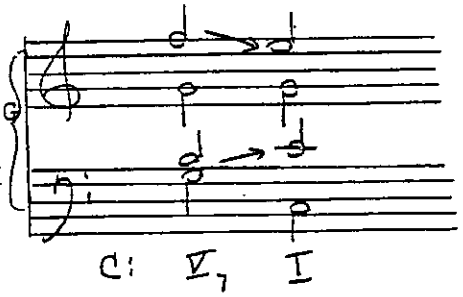
Notice that there is no fifth, G, in the I chord of the above example. The lowest voice took the root, since this example is in root position. The leading tone, B, had to take C; the subdominant, F. had to take E, so the only way to have gotten a G would have been to have the D cross over the B, making a large leap in doing so, which would in this case (and often in other cases) have caused parallel fifths with the lowest voice. Moreover, the supertonic generally has some tendency to descend to the tonic. A I like this, with triple root and no fifth sounds satisfactorily complete, especially after a dominant seventh, with its strong voice leading tendencies. This situation is very common, as will be demonstrated by opening at random almost any hymnal or folk-song collection.

The dominant seventh may have its root doubled and its 5th omitted without materially changing its quality:



To resolve this, write the bass, then resolve the tendency tones:

then keep the extra G common (in the same voice), giving the I chord a 5th, making it complete:



The incomplete V_7 has then yielded a complete I. Whenever V_7 & I are in root position, one of the following will usually be true:

A complete V_7 will resolve to an incomplete I; or

An incomplete V_7 will resolve to a complete I.

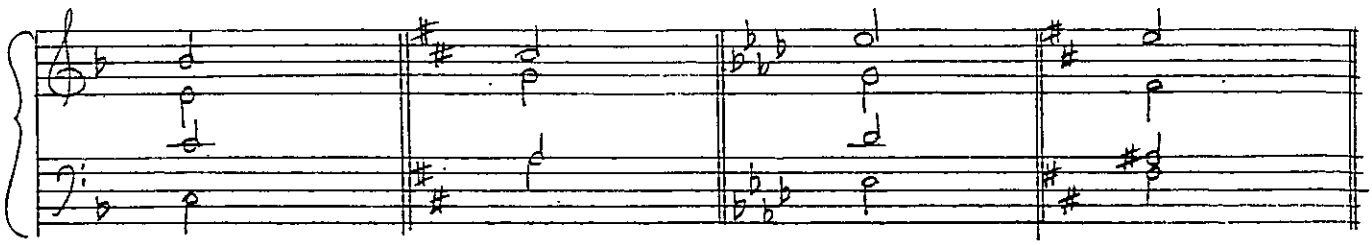
Exercise XIIa: (Independent assignment No. 55 is to study Topic XII material up to this point, and do the first two scores of the assignment below.)

Resolve the following dominant seventh chords properly. Include arrows which show resolution of the tendency tones:

Complete V_7's:

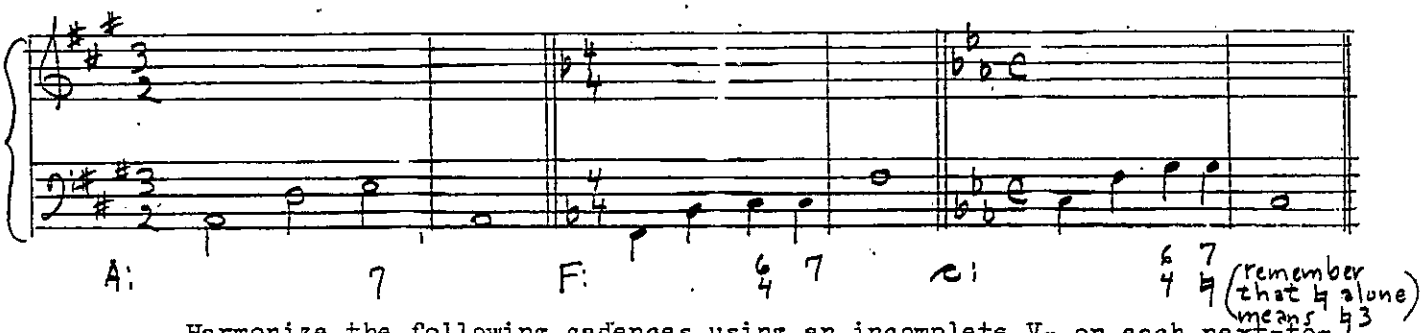
(Exercise continued on next page.)

Incomplete V_7's (Supply analysis for each example):

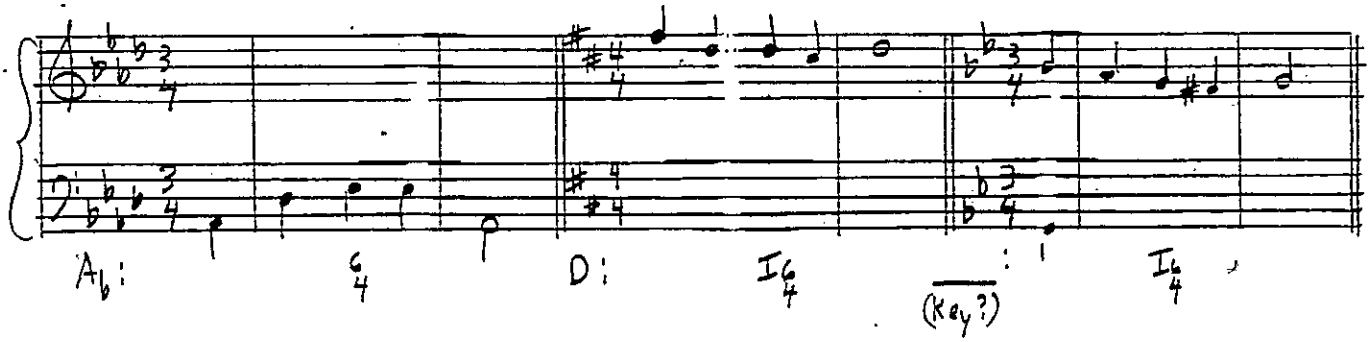


(Independent assignment No. 56 is to complete the remainder of Exercise XIIa):

Harmonize the following cadence formulas using a complete V_7 on each next-to-last chord. Otherwise, treat these as you would any figured bass:



Harmonize the following cadences using an incomplete V_7 on each next-to-last chord. Use whatever features are given or indicated by the bass figures, but otherwise harmonize using principal triads in any inversion:

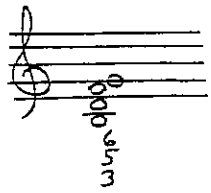


Exercise XIIb (Keyboard): (Independent assignment No. 57)

Play cadence formulas I IV I_4^6 V_7 I in the keys of F# Major, B-flat Major, and G Minor.

Dominant seventh chords may also be inverted, 3 inversions being possible because there are four tones. The 1st inversion figured bass symbols, if complete, would need to be

$V \begin{matrix} 6 \\ 5 \\ 3 \end{matrix}$:



However, these are conventionally abbreviated to $V \frac{6}{5}$.

The 2nd inversion symbols if complete would be $V \begin{matrix} 6 \\ 4 \\ 3 \end{matrix}$:

However, these are conventionally abbreviated to $V \frac{4}{3}$.

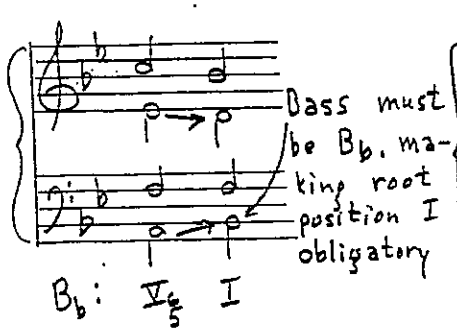
The 3rd inversion symbols if complete would be $V \begin{matrix} 6 \\ 4 \\ 2 \end{matrix}$:

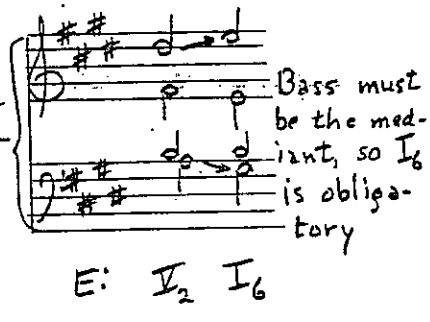
However, these are conventionally abbreviated to V_2.

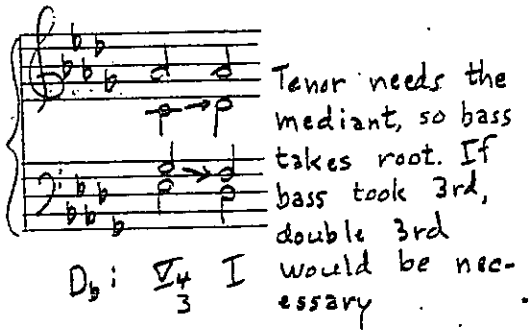
This all works out to a pattern that is very easy to remember: V_7, $V \frac{6}{5}$, $V \frac{4}{3}$, V_2, the arabic numerals simply descending from 7 through 2.

The resolution of inverted dominant sevenths is simple. The leading tone resolves to the tonic tone, the subdominant tone resolves to the mediant tone, and the remaining voices simply resolve as smoothly as possible with what is left. The result is usually a very smooth resolution which is easy to work with in part-writing, easier than with root position dominant seventh.

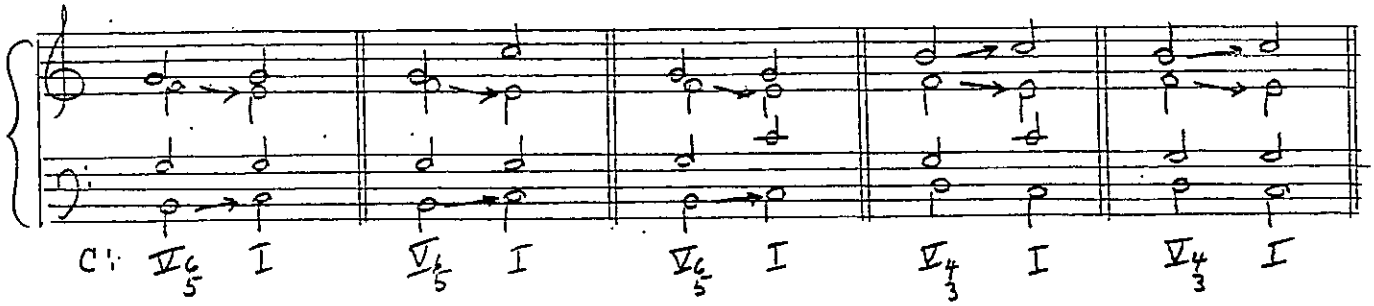
If the bass of the inverted dominant seventh is a tendency tone, the inversion of the I will be determined by the bass's required resolution. For example:





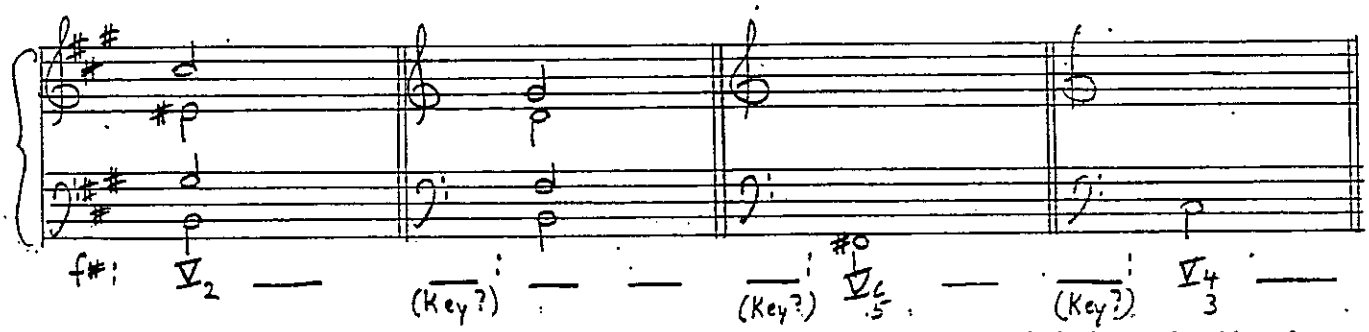


Inverted dominant sevenths may also be incomplete. The rule that resolution will be incomplete if dominant seventh is complete, and vice versa, doesn't apply to inverted dominant sevenths. Examine these examples thoughtfully, noticing the comparative freedom of treatment of voices not involving tendency tones. Also notice which chords are complete:

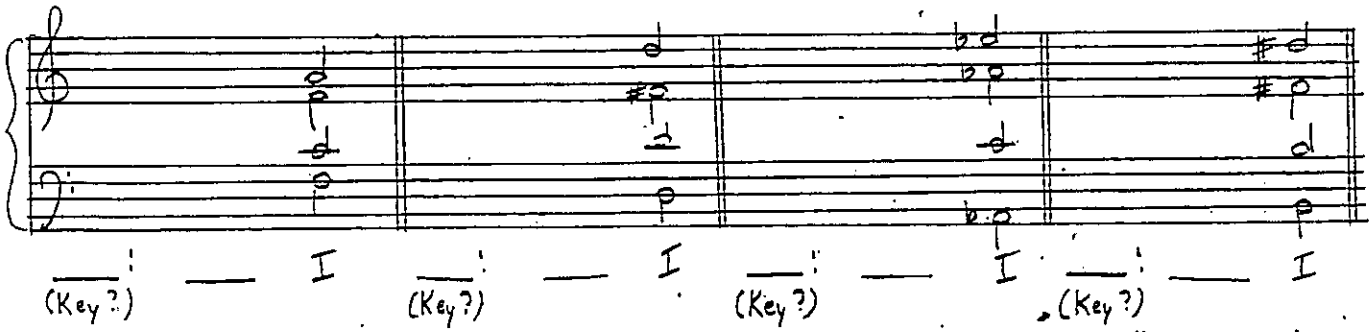


Exercise XIIc: (Independent assignment No. 58 is to study the material beginning with inverted dominant sevenths on page 4, and do the first two scores of Exercise XIIc.)

Resolve the following inverted dominant sevenths. The key signature is to be supplied if not given. Analyze everything. Show arrows for resolutions:



Below are some tonic chords. By reflecting upon which tone in the dominant seventh would have to precede each tone in the tonic, write a distribution of the dominant seventh which could resolve to the specific distribution of I chord given. Analyze and show arrows:



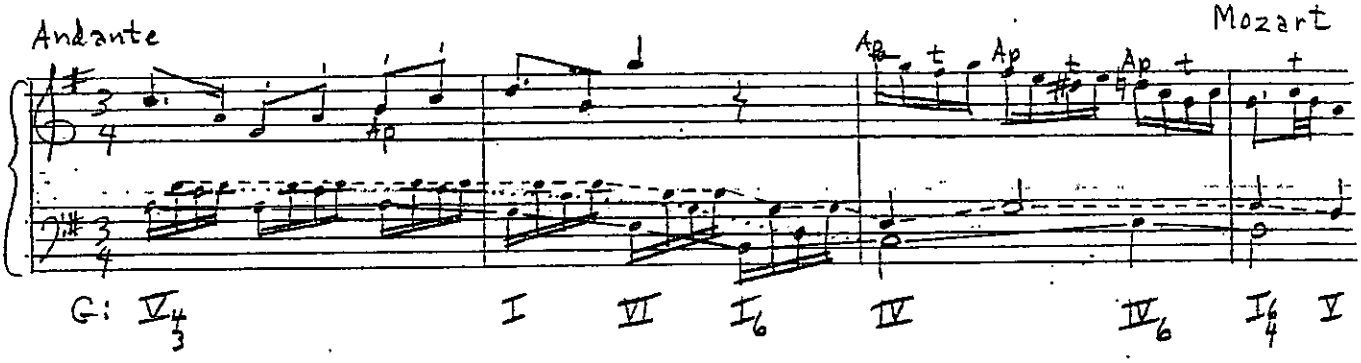
(Independent assignment No. 59 is to complete the following example.):

Write an original treatment of the following chords to the rhythms given. Remember that where dominant sevenths are used, freedom is limited by resolution necessities:

(next page)

1. The Alberti bass is the broken-chord style of "left-hand" accompaniment so common in 18th century keyboard music. In the example given, notice how various points of the accompaniment align themselves with similar other points to comprise separate lines or "voices", whose integrity must be respected. In other words, a good Alberti bass makes several voices out of one. It is very important to respect every line which is clearly outlined, whether or not a separate line was intended. Study the analysis of this carefully.

When analyzing Alberti bass music and other music of light texture, one must take into account more notes than those occuring at a given instant. For example, in the 1st measure of the Mozart example given, if one looks only at the 1st instant of the measure, he sees only the "a" & "c", whose combination is ambiguous. He must take at least the next note before the underlying harmony, V^4_3, is apparent. The arrival of each further note, especially the F# on the second beat, then confirms this. The ear does this without effort. Music must be analyzed as it sounds when played at a reasonable tempo:



The 3 kinds of lines show the outlined melodies, and how they progress. At the beginning of the 3rd measure, 2 of the voices join into 1, reducing the 3 accompaniment voices to 2 for the next phrase member.

2. Another keyboard style, best typified by the left-hand style of Chopin lyrical piano works, is shown in the following example. This has a broader range and is generally in a more free style than the Alberti, but again every line suggested is respected and completed. These styles are further examples of the principle that harmonies inevitably have voices making them up, that their presence is inescapable, and that their integrities must be respected.

The left hand has 4 distinct lines here, all of which are finished. One could even hear the top left-hand line as two lines, one holding F and the other going "D-flat, E-flat, D-flat, etc.", and no matter which choice one makes, in either case the line is completed.

The bracketed motive is an example of the freer addition of new voices characteristic of piano style. But here, too, the new voice is complete in a short phrase. If one counts the left hand as carrying 5 lines, one can trace seven

different lines here, with never more than 3 tones sounded at once. Remarkable!

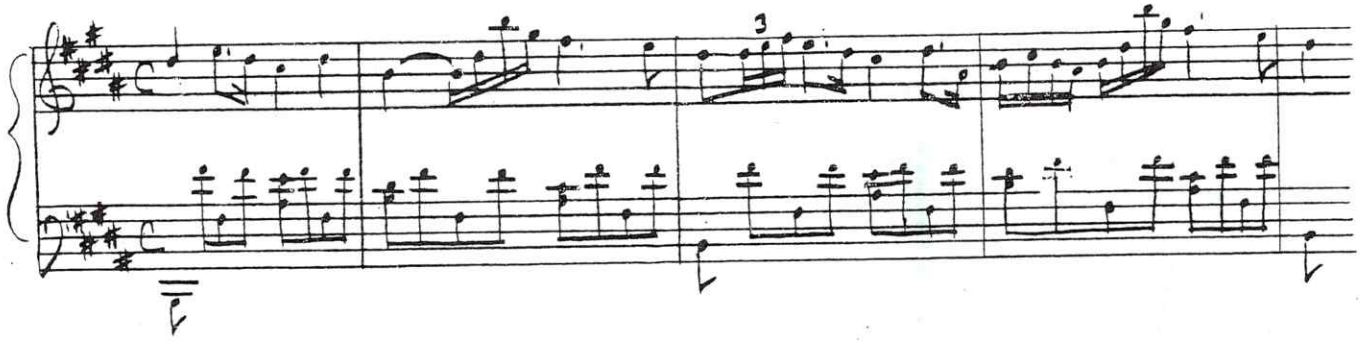
3. An example of the bass-and-afterbeat style used in dance and march music is given below. There is usually more freedom in the voice leading in rhythmic music than this particular example shows, we regret to say. This is probably an important reason why such music is not more respected by the more competent musicians. The strongly rhythmic character is more sought after in such music than the neat completion of the lines.

There is also a new use of $\frac{6}{4}$ chord frequently employed in such music. It may at first appear to ge released from the usual necessity of "resolving" $\frac{6}{4}$, but careful examination reveals that it is not. The resolution is only delayed, "carried over", to a later point after an interruption.

portion of Semper Fidelis J. P. Sousa

The tension of the second inversion chord ($V\frac{4}{3}$ here is equivalent to $V\frac{6}{4}$, except that it includes the seventh) is "resolved" on the 1st beat of the 3rd measure, on the root of I, as shown by the solid line. The $I\frac{6}{4}$ acts as "pedal $\frac{6}{4}$", or "straight-line" bass with the V_7's on the second beat of each measure, as shown by the dotted line.

Exercise XIIIc: (Independent assignment No. 66 is to read the above material and do this exercise.)

Analyze completely (with chord numerals and nonharmonic tone abbreviations) the following Chopin excerpt. With solid, dashed, dotted, and dash-dotted lines (or colored pencil lines) trace the various musical lines inherent in the left-hand part. Several reasonable interpretations are possible:

Chopin